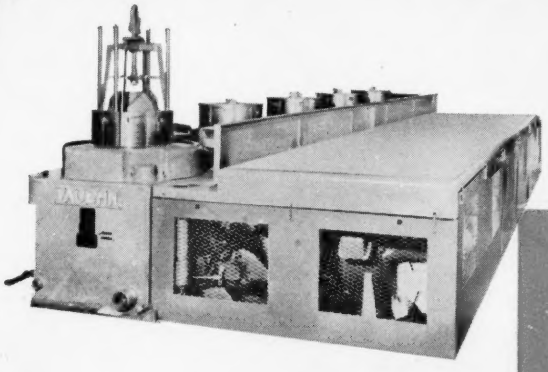
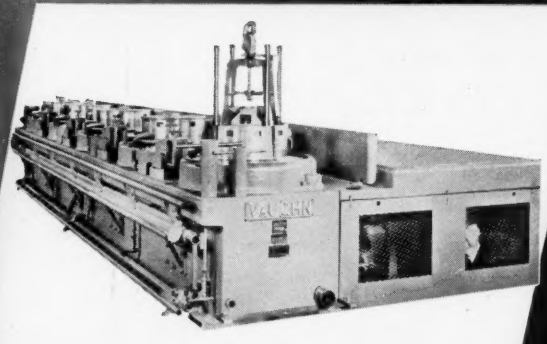
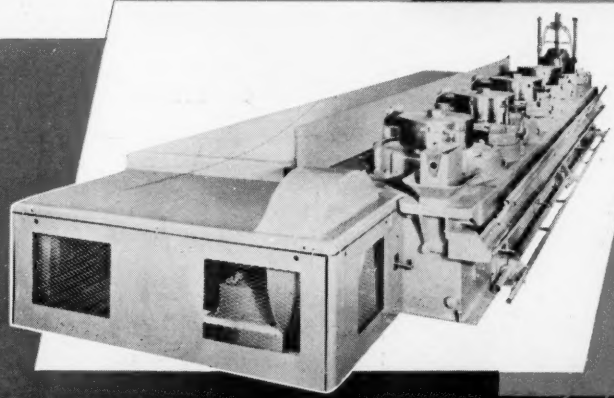
WIRE AND WIRE PRODUCTS

NOVEMBER 1944







HRX MOTOBLOX

V Vaughn

WIRE DRAWING MACHINERY

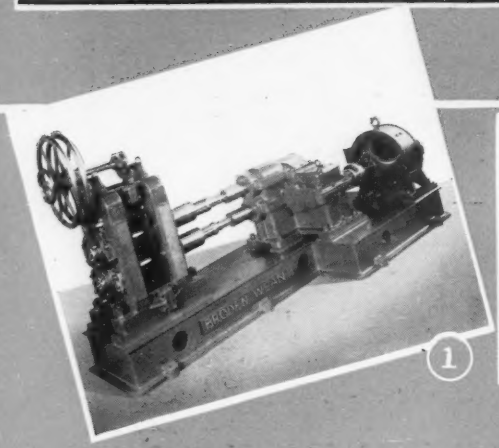
The Vaughn HRX Motoblox pictured here is a larger edition of the now famous line of HR machines—drawing all kinds of wire from the rod. This machine was developed to take 7/16" supply of high carbon rod. It is also being used on 52100 ball-bearing steel, starting at 3/8" and smaller. Blocks are air and water-cooled.

THE VAUGHN MACHINERY COMPANY
Cuyahoga Falls, Ohio

COMPLETE COLD DRAWING EQUIPMENT
Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATIO

WEAN-BRODEN



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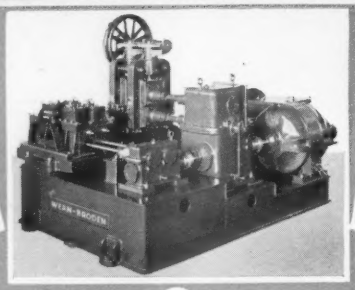

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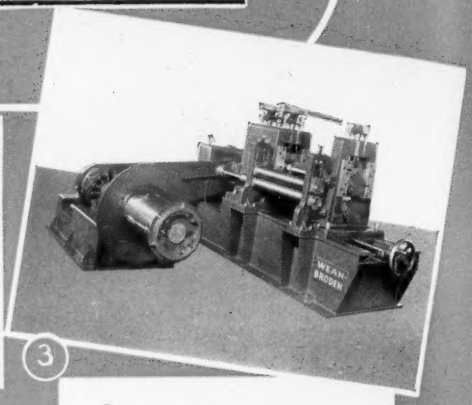

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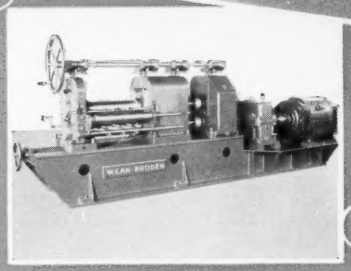


4

1. Small Cold Rolling Strip Mill
2. Special Strip Cold Rolling Mill
3. Strip Reel and Slitting Unit
4. Heavy Duty Slitter
5. Special Alloy Single Draft Heavy Duty Vertical Wire Drawing Block for 5/8" Round Rod

THE Wean Engineering Company, Inc., have long been recognized as Specialists in sheet, strip and tin mill equipment. . . . The Broden Construction Company specializes in the manufacture of narrow strip and wire mill equipment.

With the extended facilities of The Broden Construction Company as a subsidiary of The Wean Engineering Company, Inc., it is now possible to serve the steel industry more effectively.

COLD ROLLING MACHINERY

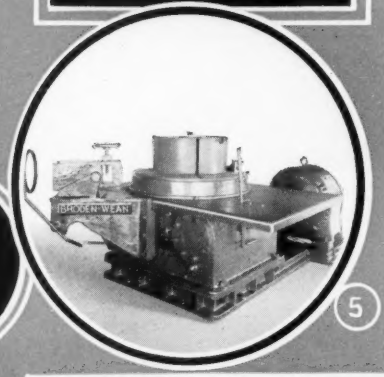
For 36" Wide Material and Narrower

Mills • Reels • Slitters • Levelers • Coilers • Edgers
Scale Breakers • Shears • Scrap Ballers
Continuous Pickling

WIRE MILL EQUIPMENT

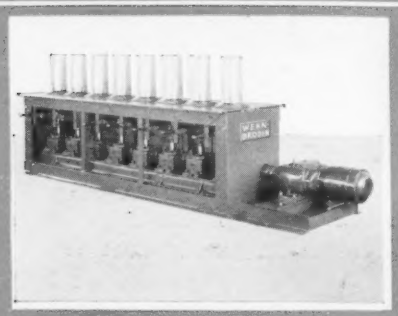
Wire Drawing Machines • Patenting • Galvanizing and Tinning Take-Up Frames • Wire Flattening • Spoolers
Nail Galvanizing and Blueing

HOLMQUIST BARBED WIRE and WIRE FENCE MACHINERY

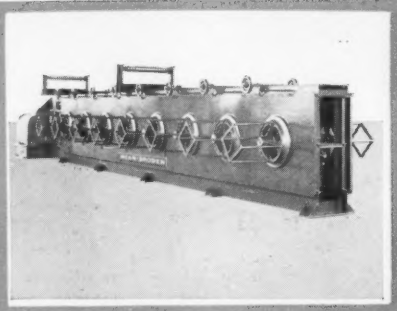


5

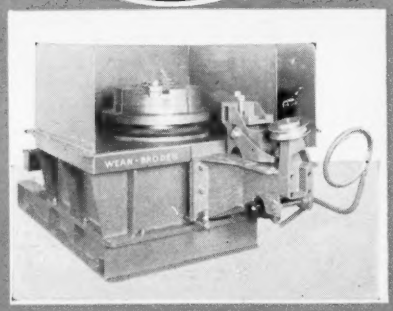
The BRODEN CONSTRUCTION Co., Inc., Cleveland, O.
A SUBSIDIARY COMPANY OF
The WEAN ENGINEERING Co., Inc., Warren, O.



FINE WIRE TINNING UNIT

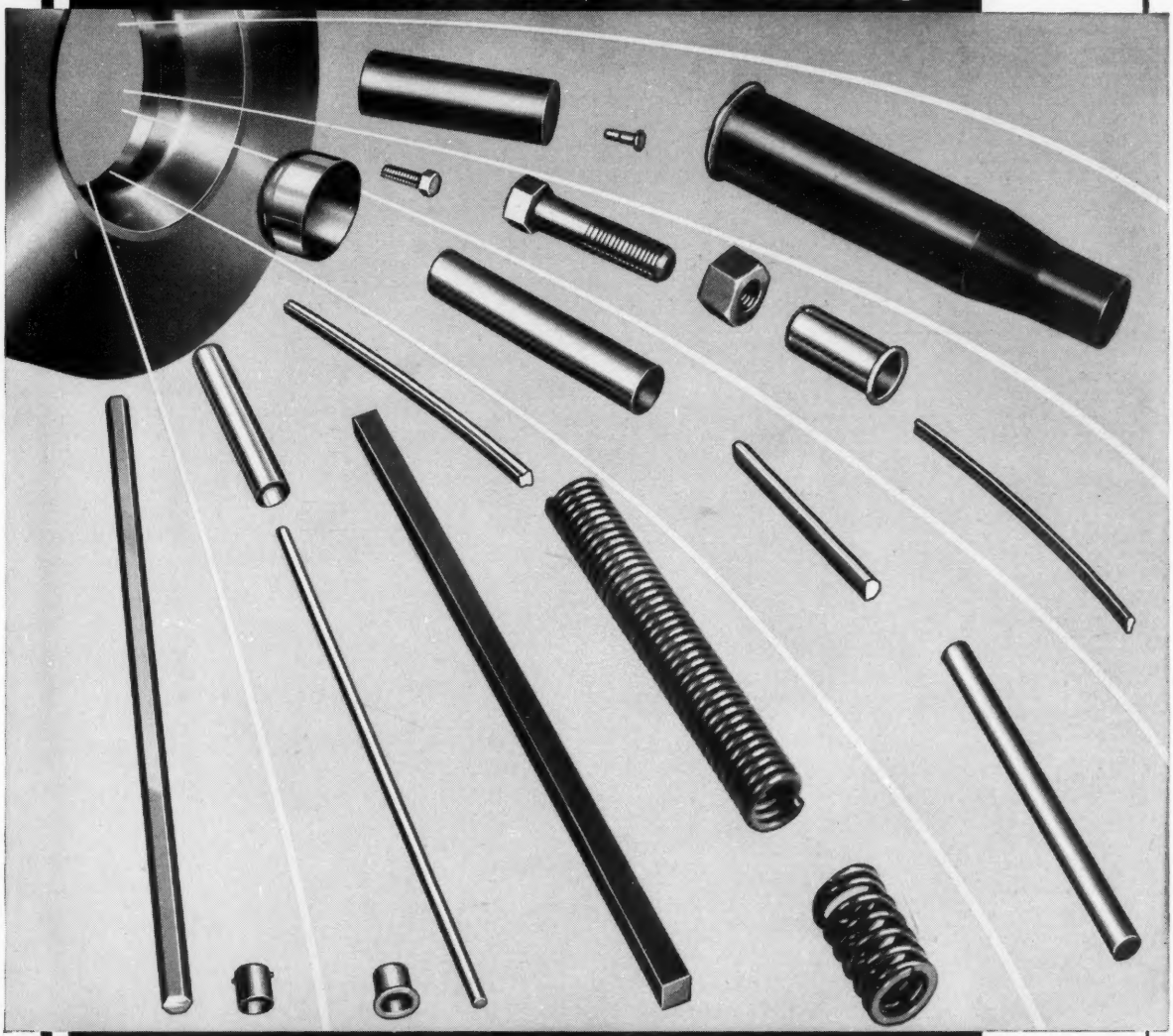


MULTIPLE WIRE TAKEUP FRAME



TWO DRAFT CONTINUOUS WIRE DRAWING MACHINE

Complete Service
. . FOR ALL YOUR CARBIDE DIE NEEDS



With the rapidly expanding use of carbide dies in all fields of die application—in sizes up to 16"-18" I.D.—Carboloy Service today is more important than ever before to your mill. This service includes such outstanding features as: Prompt deliveries from local stocks in key cities • Regional die service specialists • Exclusive Carboloy-developed finishing and servicing equipment • Free training course for die room personnel • Comprehensive assistance in proper die room layout and operation.

Take advantage of Carboloy Service—for all your carbide die requirements.

CARBOLOY COMPANY, INC.
11171 EAST EIGHT MILE ROAD

Wire Bar and Tubing Dies • Sheet Metal Dies • Shape Dies • Press Work Dies • Mandrels • Spring and Wire Forming Tools • Extrusion Dies • Die Finishing and Service Equipment.

CARBOLOY
REG. U.S. PAT. OFF.
CEMENTED CARBIDES
COMPLETE DIE SERVICE FOR WIRE, BAR, TUBING AND SHEET METAL

Wire netting, supporting camouflage of steel wool and foliage, screens heavy U. S. guns from the sharp eyes of enemy fliers.

Information about enemy activity and numerical strength is sent back to headquarters over a line of field telephone wire.

Wire-wrapped fragmentation bombs, dropped from low-flying planes, explode and scatter jagged steel slugs in all directions.

Steel wire is used in machine-gun mechanism, as well as in scores of other important applications, on U. S. fighters and bombers.

It takes all kinds of wire to win a war

Steel wire is used in vital parts of gun mechanisms. . . . It carries messages back from advanced observers over field telephone systems. . . . It is wrapped around fragmentation bombs, so that it breaks up and scatters when the bombs explode. . . . It does scores of jobs in airplanes and tanks and warships . . . and in virtually every other kind of fighting equipment.

Wire from Bethlehem mills is going into every wartime use, both in military equipment and in the countless places where steel wire serves on the production front at home.

It takes all kinds of wire, and a lot of wire, to win a war. And when the war is won, steel wire from Bethlehem's modern, precision mills will again be available for the multitude of uses in which wire contributes to technical advancement and better living.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

BETHLEHEM STEEL

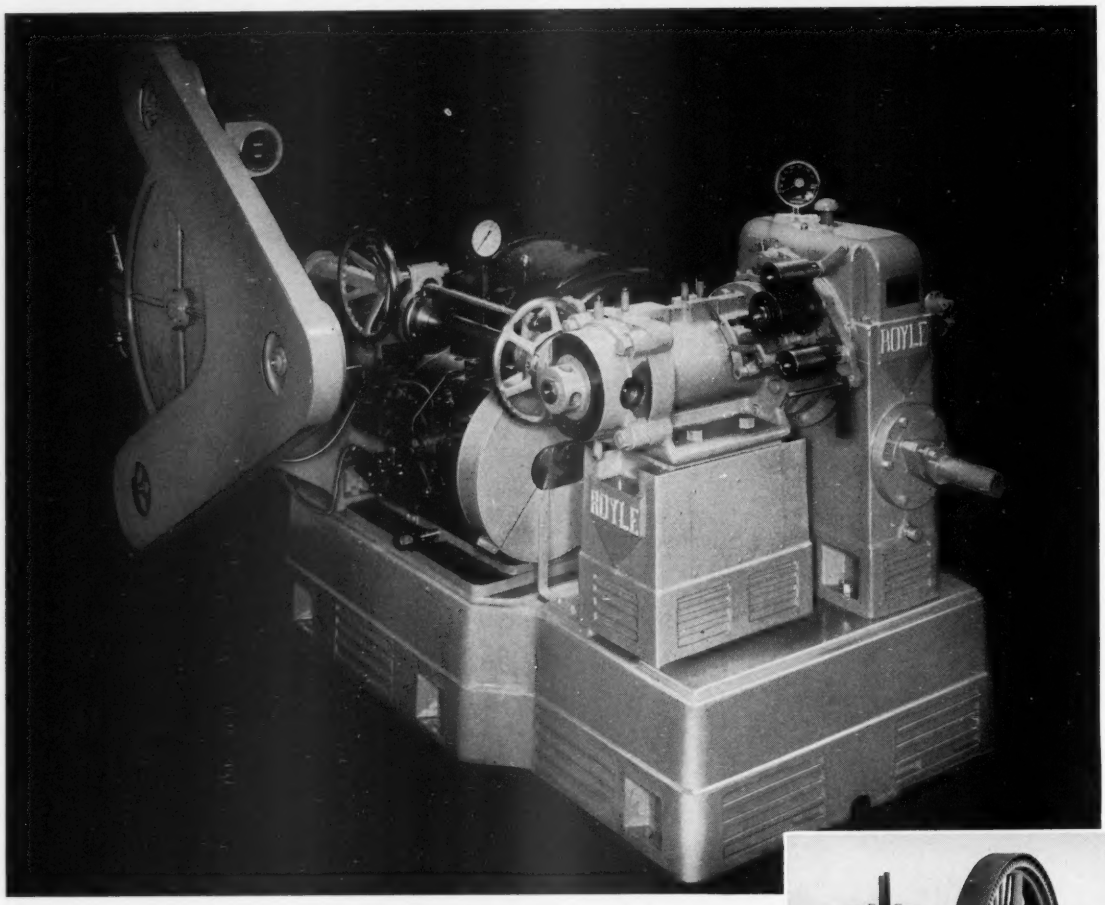
Bethlehem Steel Export Corporation, New York City

That, in briefest words, is the fundamental purpose of our WIRE LUBRICATION COMPOUND SERVICE. We wish you to regard our Standard Industrial Compounds Company in the status of CONSULTANT AND MANUFACTURING CHEMISTS, whose primary purpose is to further development of all forms of wire and metal drawing LUBRICATION and CLEANING to the highest possible degree of perfection, and further to provide the members of the Wire Industry with an effective point of recourse for the solution of any production problem that may be giving them trouble. We shall greatly appreciate the opportunity at any time to be of service to you.

For a complete listing of our Formulas and a more detailed account of our service, send now, while you have it in mind, for our Catalogue of Products, entitled, "WIRE AND WIRE DRAWING—IN WORLD PROGRESS."

STANDARD INDUSTRIAL COMPOUNDS CO.

4600 W. Ferdinand Street • Chicago 44, Illinois



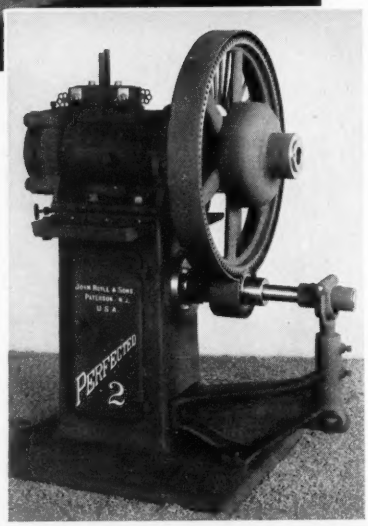
No. 2 Royle Continuous Vulcanizing Machine equipped with Stock Screw Speed Tachometer and Sperry Exactor Control.

"We Like Our High Speed Extruder..."

A lot of water has flowed over the dam since the first Royle Extruder was introduced sixty-four years ago. In 1880—and during the following decade—an impenetrable veil of secrecy existed. No extruder had ever been seen in operation nor had any report on production achievements ever been received.

That veil of secrecy is gone. In its place has come a spirit of wholesome cooperation. This cooperative spirit makes it possible to design Royle Extrusion Machines to meet the specific requirements of the application involved. As always cooperation produces maximum results.

Today, Royle production is devoted to the requirements of the Armed Forces. New applications of extrusion processes are being developed. These new processes hold promise of new and better products when Victory has been won.



No. 2 Royle Tubing Machine of 1905

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

ARMY E NAVY

PIONEER BUILDERS OF EXTRUSION MACHINES SINCE

PATERSON 3, NEW JERSEY

Continental Europe	Home Office	Akron, Ohio
James Day (Machinery) Ltd.	B. H. Davis J. W. VanRiper	J. C. Clinefelter
London, England	SHerwood 2-8262	UNiversity 3726

A new address

for CHENEY BROTHERS' *Sales Offices*

★ ★ ★

On or about November 15th, the showrooms and selling offices of Cheney Brothers will be located in *The Empire State Building, 350 Fifth Avenue, New York City.* This applies to all divisions except the Decorative & Upholstery Department, which remains at 509 Madison Avenue, New York.

OUR NEW LOCATION offers Cheney Brothers' customers the utmost in convenience and accessibility. Here—in a setting entirely worthy of the Cheney reputation—Cheney velvets, cravats, men's wear fabrics and industrial products will be made available to the trade.

This move is entirely in keeping with the Cheney policy of modernization. In this—just as in the new methods and equipment used in the Cheney mills—Cheney Brothers look to the peacetime future ahead. And we can all bring that future nearer, make it brighter, by buying *extra* War Bonds now!

★ CHENEY YARNS

CHENEY BROTHERS

Manufacturers of fabrics of exceptional quality since 1838

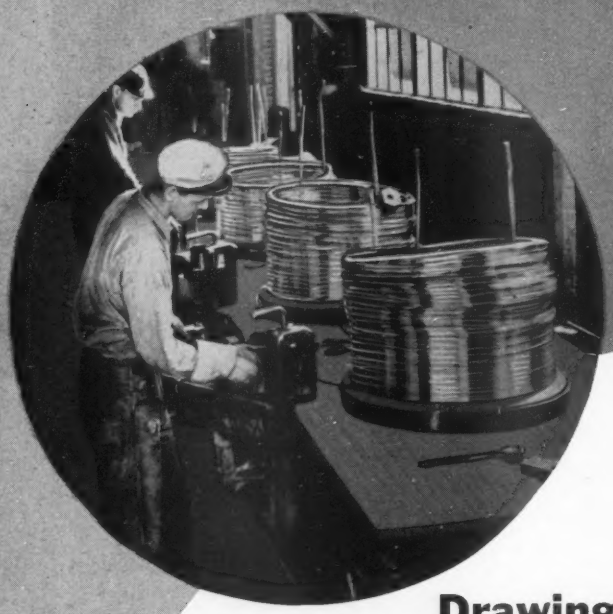
Velvets—Pile Fabrics—Upholstery and Decorative Textiles—Men's Wear Fabrics
Cravats—Yarns for Industry—Industrial Textiles—Machine Threads

Sales Offices

NEW YORK • BOSTON • PHILADELPHIA • CHICAGO • LOS ANGELES

MILLS AT MANCHESTER, CONN.

ALSO AT MANCHESTER, CONNECTICUT, A SUBSIDIARY...PIONEER PARACHUTE COMPANY



Let Magnus Work Out Better Drawing Lubricants For You

Are you getting the drawing speeds you want?

Is die life satisfactory on all your drawing operations?

How about the finish you are getting on your wires? Are you having any troubles with dull finish or scratches?

Magnus has had such success in working out special wire drawing lubricants for specific types of wire and definite drawing methods, that it will pay you to give us an opportunity to design compounds for any of your operations where results are not as satisfactory as you might wish.

Certainly the experience of the last two years where drawing speeds have been boosted to nearly three times what they used to be, by the use of lubricants specifically compounded to attain that goal, indicates that work along these lines will prove well worth while. Magnus has always specialized in producing "tailor-made" wire drawing compounds, although it has also developed a wide range of materials which are giving excellent results over a considerable range of wet, dry and grease drawn wires.

Let us have an outline of the improvements you'd like to make in your drawing operations and if one of our standard compounds will not make make them possible, we will work out a special material with you.

All the improvements you want may not be possible, but experience plus try-out should lead to worthwhile betterment of your operations.

Magnus

MAGNUS CHEMICAL COMPANY · 188 SOUTH AVENUE · GARWOOD, N. J.

WIRE DRAWING COMPOUNDS

CONTINENTAL WIRE MADE TO SPECIAL SHAPES

CONTINENTAL produces wire in many special shapes to fit manufacturer's requirements. Wire of special shape may add greatly to the appearance or quality of a product. Continental wire may be drawn to an intricate shape to fit into a special assembly or it may be drawn to a special shape to be used as a decorative molding.

Continental wire made to special shapes is available in a great variety of sizes and finishes. It has cut costs for many manufacturers. Even buyers of moderate size lots have realized substantial savings. You are invited to write or wire your requirements today.

CONTINENTAL STEEL CORPORATION • KOKOMO, INDIANA

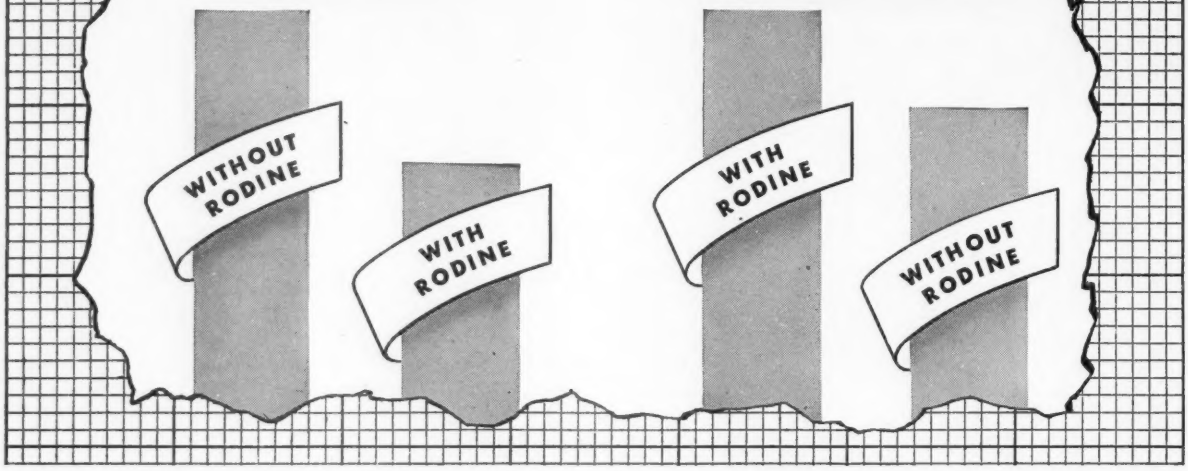
CONTINENTAL
STEEL CORPORATION

PRODUCERS OF— SHEETS: Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terne, etc.
WIRE: Bright Basic, Annealed, KONIK, Coppered, Tinned, Special Manufacturer's, etc.

Rodine STOPS PICKLING WASTE

PICKLE BATH COMPARISONS • CASE HISTORY No. 707

PICKLING ONE TON OF STEEL



Pickling one ton of steel with RODINE in the pickle bath required 50 lbs. less acid and yielded 25 lbs. more pickled steel than one ton pickled without RODINE.

Only 1/4 pt. of RODINE was required, to make these savings, at a cost of approximately 6 1/4 cents against a saving in acid of about 25 cents and increase in steel produced of around 50 cents.

RODINE saved approximately 12 times its cost in acid and metal saved. A further plus value is realized by minimizing rejections due to embrittlement and blistering.

RODINE has revolutionized pickling by confining the action of acid to the removal of scale and rust and inhibiting its action on clean metal. Before Rodine was developed by ACP Chemists there was always an excessive consumption of acid due to its wasteful attack on clean metal. It is now possible to schedule larger production of well-pickled steel and be assured of obtaining it. As the acid attack on clean metal is reduced by Rodine, much less hydrogen gas is liberated with a result that the objectionable acid spray is reduced if not eliminated. Further, with less hydrogen evolved in pickling, less is absorbed into the metal and less embrittlement occurs.

ACP PICKLE BATH TONERS, at times used along with suitable RODINES, at other times alone, improve pickling under abnormal conditions. If, for example, work is oily, the addition of Pickle Bath Toner will improve the pickling. In cool sulphuric acid baths where little inhibition is desired, the addition of Pickle Bath Toner will improve the pickling and pickled surface. The dragout loss in any pickle bath is reduced when the Toner is used.

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.

Note: West Coast Plants may address inquiries and orders for prompt delivery to: Leon Finch, Ltd., 728 East 59th St., Los Angeles, Calif.

American Chemical Paint Company, Ambler, Pa.
Please send me general Technical Service Data Sheets on
☐ Rodine ☐ ACP Pickle Bath Toners

*Name*_____ *Title*_____

*Company*_____

*Address*_____

D-11

STEEL SERVES THE GUNS
WITH MILLIONS OF SHELLS

Steel moves along shell production lines in a smooth, continuous flow. Each operation brings it nearer the size and shape used to drench the enemy with destruction — at lowest cost in American lives.

Converting steel into many different types of shells by the millions calls for adaptability of resources and equipment, for ability of management to solve new production problems quickly, and for resourcefulness of men and women workers in mastering new skills and methods.

The American *will to do* — at J&L and throughout the steel and allied industries — is such that the shell program keeps pace with the changing needs of the armed forces and supplies the guns as the gunners serve them — swiftly, accurately, with devastating effectiveness.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA

J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR

BIG SHELLS SAVE LIVES

"Black Panther," invasion pin-up gun, is an Army Ordnance 8-inch 23-ton mobile weapon that fires 256 pounds of steel and high explosive a distance of 20 miles so accurately it will drop its big shells "right on the courthouse steps." This gun out-ranges Germans' best gun by 2 miles, fires shell 100 lbs. heavier. Half the total production of steel shells is being made in Pittsburgh Ordnance District for the "Black Panther" and the 14-ton, 8-in. howitzer on wheels, maximum range 10 miles.

Cannon derives from "kanna," Greek for tube, literally a hollow reed, like bamboo.

Drenching the enemy with big shells to save American lives was theme of a demonstration-conference Army Ordnance Chiefs recently held with other shell manufacturers at McKeesport (Pa.) Works of Jones & Laughlin Steel Corporation. Led by Maj. Gen. Levin H. Campbell, Chief of Ordnance, and Brig. Gen. R. E. Hardy, Chief, Ammunition Branch, the party inspected plant where bomb line was converted to artillery 8-in. shell line (see illustration) in record time.

Propaganda shot to enemy in howitzer shells is working to break Axis morale, the army reports. 105mm shells, (over 3 million produced in J&L McKeesport Works), are timed to burst over enemy territory, scattering printed leaflets telling truth about war. They are well received, prisoners report.

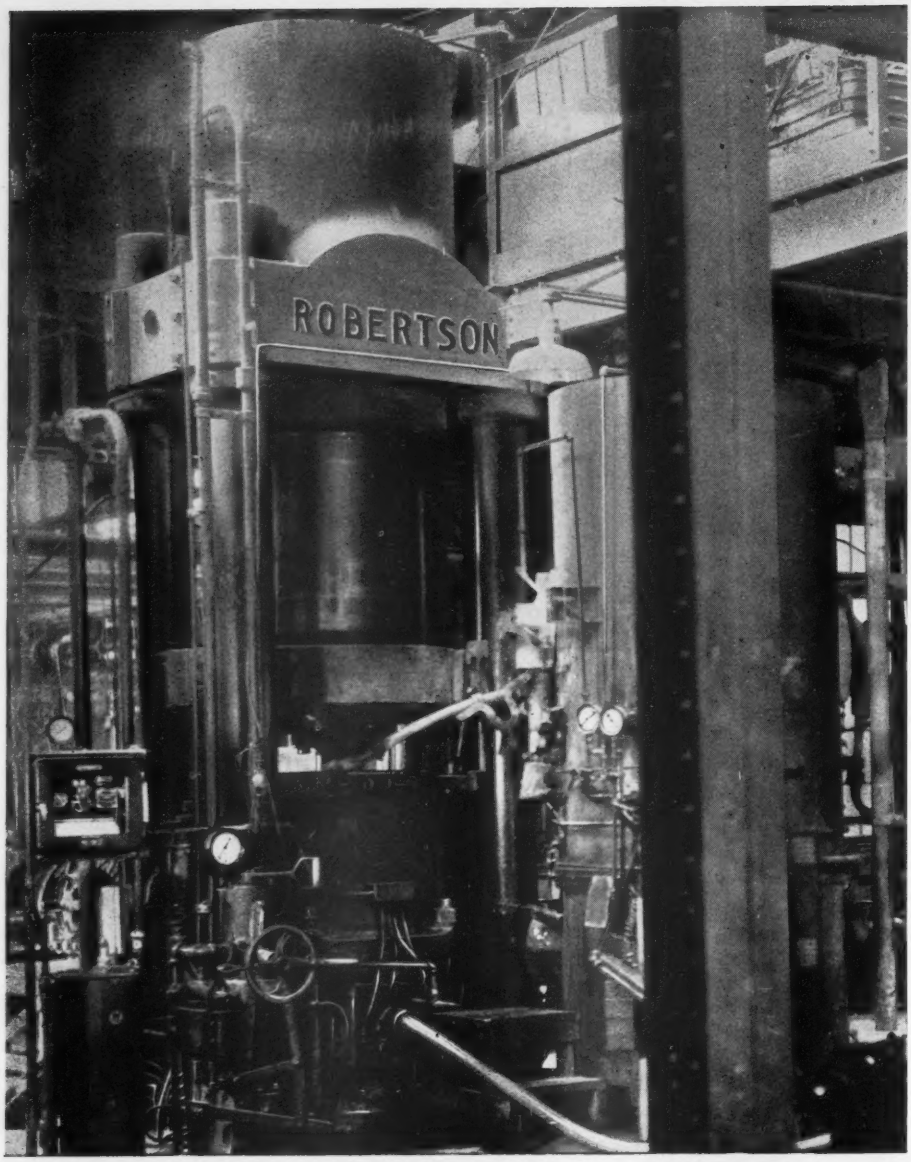
Gun barrel got its name from 14th century Flemish weapons made of iron strips fashioned into long tubes and bound by hoops, like wine casks or barrels.

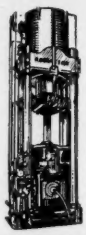
First gun using powder was built in Flanders about 1314. Called "fire pot," it was shaped like a vase, shot heavy, 4-sided, iron-headed arrows, was fired by wary gunner with lighted taper, who touched priming powder—and ran.

Gunpowder not Chinese invention, in opinion of many historians. Some give credit now to Roger Bacon, English author and alchemist (1214-1292).

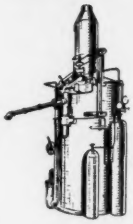
First shell forgings for this war made on an upsetter were produced by J&L Aliquippa Works in 1940 for British 6-inch shell. Using peace-time machinery without conversion, these forgings effected a substantial saving of steel. Aliquippa and Pittsburgh Works of J&L, as well as McKeesport Works, are furnishing great quantities of bomb casings, shell blanks and fragmentation bombs.

"He shall flee from the iron weapon and the bow of steel shall strike him through" (Job, 20, Oxford Bible) is one of few references in Scriptures to these metals applied to weapons of war. This prediction of startling timeliness foretells that: "The triumphing of the wicked is short. Though his height mount up to the heavens and his head reach into the clouds, yet he shall perish forever. And the earth shall rise up against him."

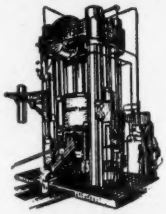




Cable Lead Encasing Press



Closed Lead Melting Pot



Hose Lead Encasing Press

Hydro-Pneumatic Accumulator

High Pressure Hydraulic Pump

SIGNIFICANT...

Roebling, Goodyear, General Electric, General Cable, Western Electric, U. S. Rubber, Anaconda, Goodrich, Swan, Boston, Northern Electric

The majority of leading makers of vulcanized rubber hose and rubber insulated wire and cable use equipment engineered by Robertson.

Lead encasing presses, operating valves, hydraulic pumps, lead melting pots and lead sheath stripping machines, hydro-pneumatic accumulators. Many use them all, they've found it pays to employ complete installations all engineered by one maker. A completely integrated "production line," with each machine designed as a perfect complement of the others, to form a smoothly producing unit.

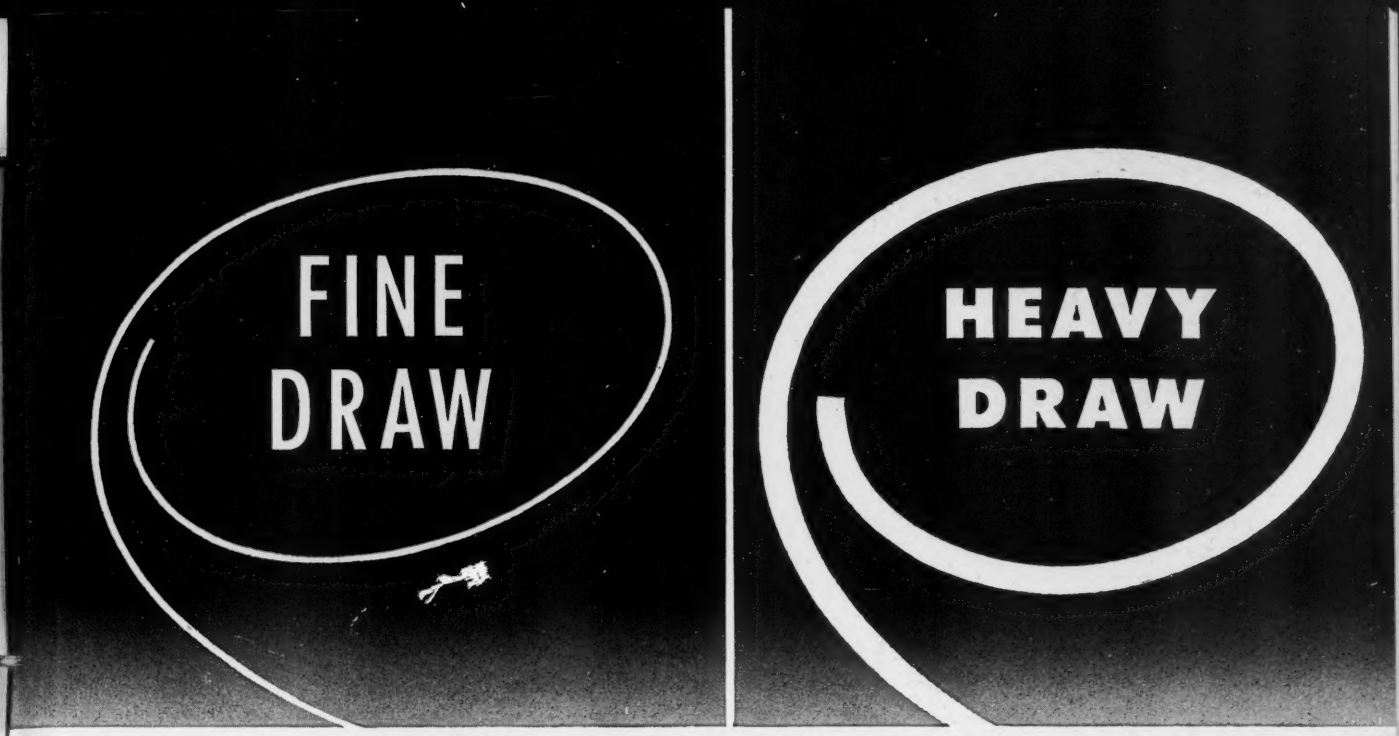
JOHN **Robertson**

COMPANY INCORPORATED

125-135 WATER STREET, BROOKLYN 1, NEW YORK

Designers and Builders of all Types of Lead Encasing Machinery

Since 1858



Shelldraw

COMPOUNDS HAVE THE ANSWER TO BOTH!

• From the finest wire to the heaviest . . . drawing ferrous or non-ferrous metals . . . there's a Shelldraw Compound designed to meet every wire-drawing requirement.

Veterans of many a tough job that at first appeared unsolvable, Shelldraw Compounds come to you backed by a time-tested record of broad, successful experience; plus these outstanding advantages:

1—High soap-fat content. More useful lubricity and metal protection.

2—Stability in storage and in emulsion.

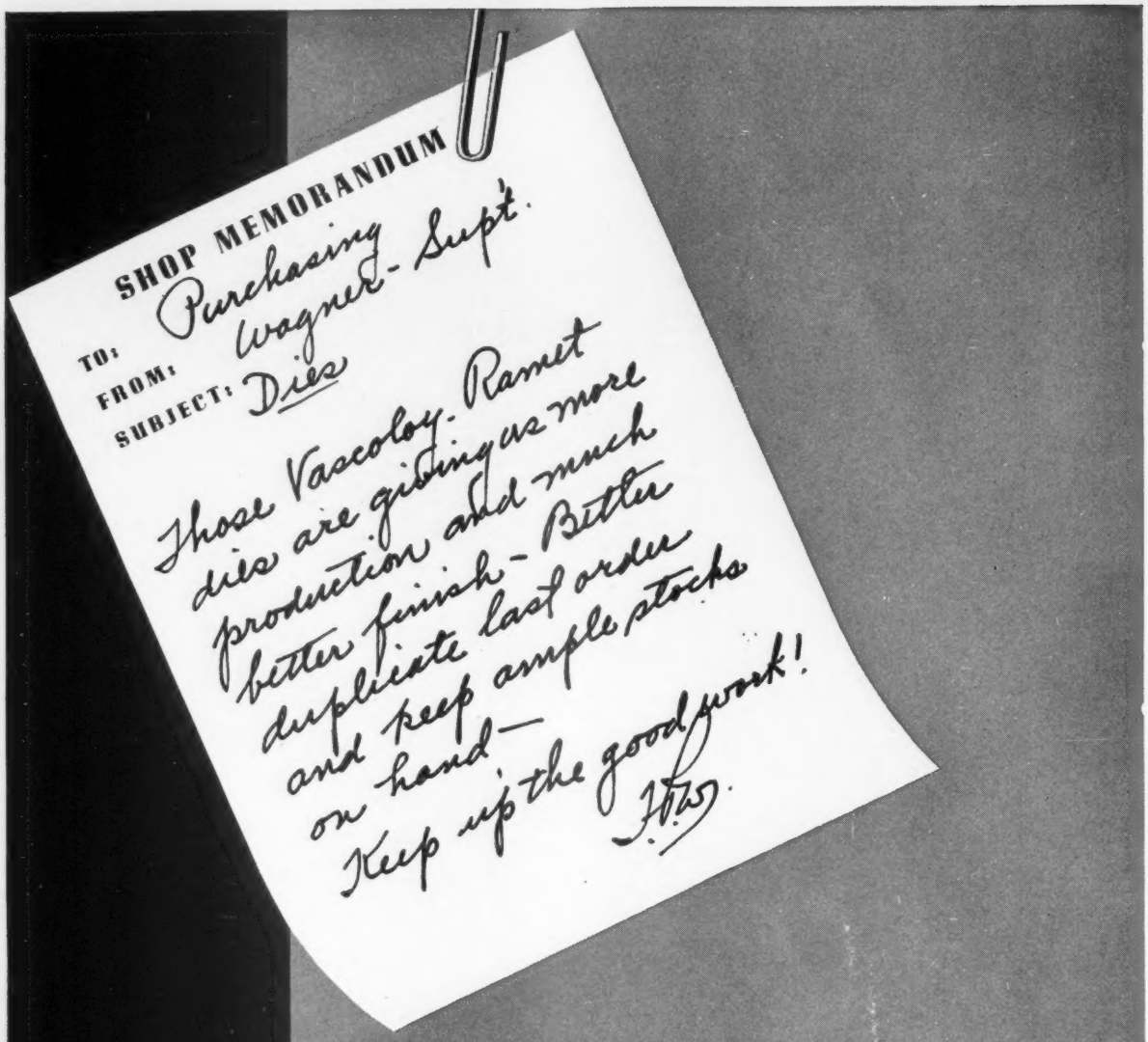
3—Exceptionally easy to clean. Do not require inflammable solvents to remove. Surfaces can be readily cleaned by warm, light alkaline wash.

4—Non-irritating to skin. Clean in appearance . . . odor slight and pleasant.

Why not find out how Shelldraw Compounds can step up *your* production? An experienced Shell Lubricating Engineer will be glad of the opportunity to review your production set-up and make his unbiased recommendations.

SHELL OIL COMPANY, INC.

SHELL


SHOP MEMORANDUM
TO: Purchasing
FROM: Wagner - Supt.
SUBJECT: Dies
Those Vascoloy-Ramet dies are giving us more production and much better finish - Better duplicate last order and keep ample stocks on hand—
Keep up the good work!
J.W.

TANTALUM-TUNGSTEN CARBIDE DIES produce more tonnage with better finish. Time spent in shut-downs for die changes, and for polishing and re-cutting dies—all affect production. Tantalum-Carbide has a definite lubricating action—it reduces the tendency of the wire or rod to gall and seize as it passes through the die. Result: A smoother finish free from score marks!

Makers of
VASCOLOY-RAMET
CARBIDE TOOLS &
TANTUNG CAST
ALLOY CUTTING TOOLS

Ramet
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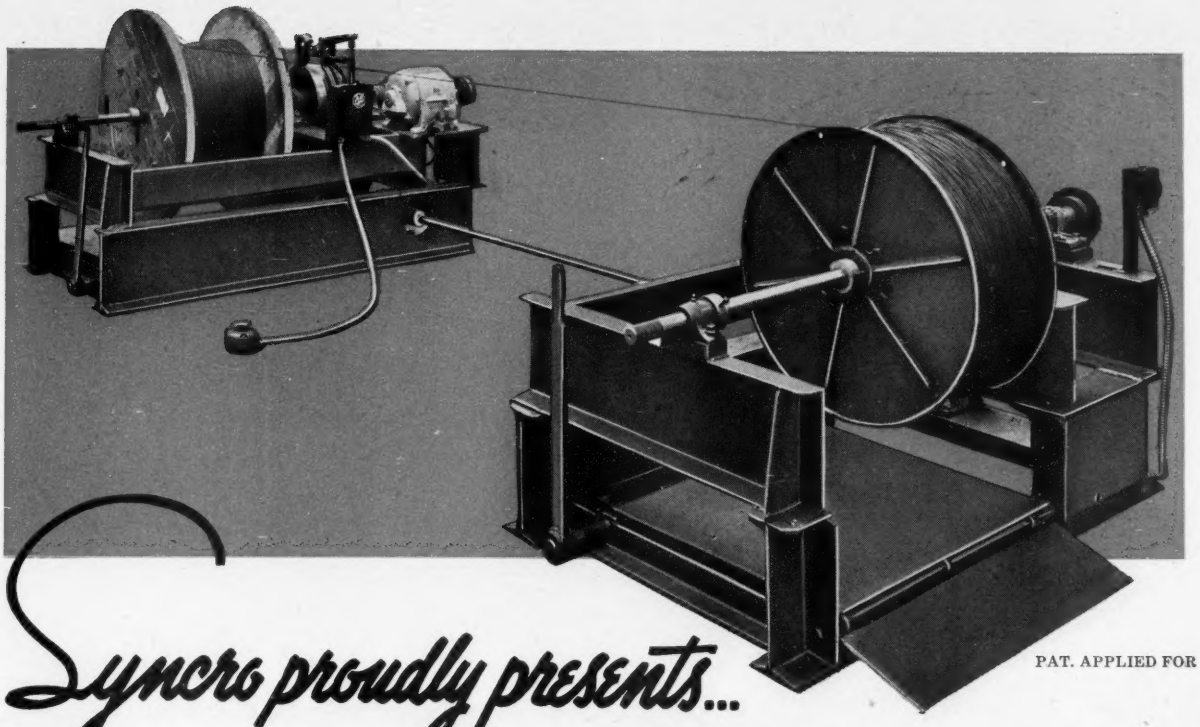

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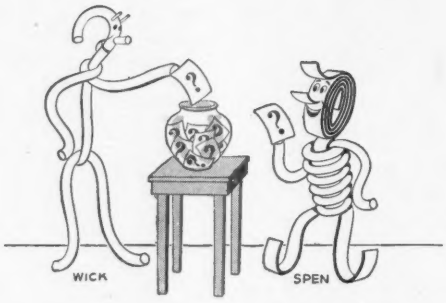

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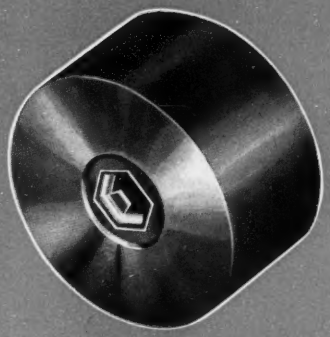

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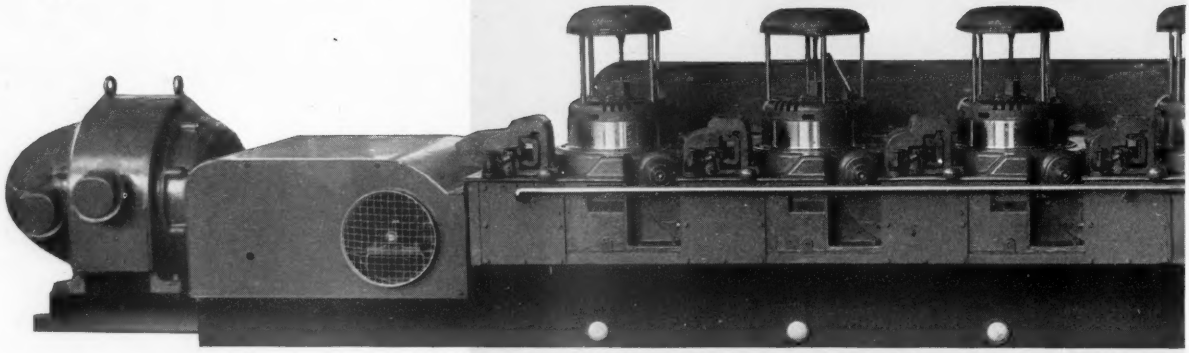

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A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 19 NOVEMBER, 1944 No. 11

Designated as

Official Publication By The Wire Association

Contents

"The Behavior and Control of Wet Wire Drawing Lubricants for Copper," by Robert C. Williams 771

Convention Sidelights 773

Notes on Convention Technical Papers, by R. E. Brown 776

Advisory Committee Recommendations 781

A—Brass Mill Advisory Committee

B—Small Diamond Die Research

C—Wire Rope Advisory Committee

Outstanding Personalities of the Wire Industry 783

Government Wire Production Information 785

A Review of Recent Wire Patents 792

Index to Advertisers 808

Where-to-Buy 809-812

— ASSOCIATE EDITORS —

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Lancaster, Allwine & Rommel, Consultants on Patent Information

Richard E. Brown, General Manager
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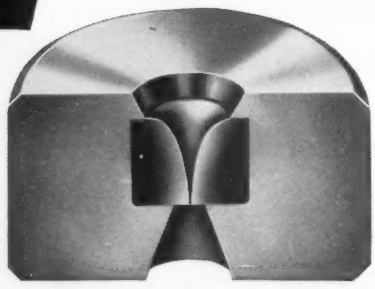
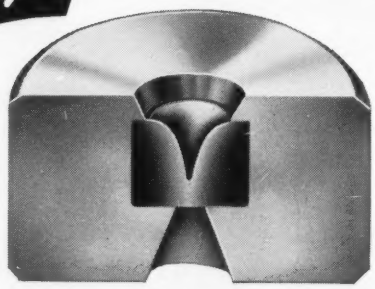


PIERCED DIE—Hole ROUGH CORED THROUGH THE NIB saves Die-User's time. Pierced hole, .003″/.004″ dia., is ready for finishing to as small as .010″ dia.

OLD WAY



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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 19 NOVEMBER, 1944 No. 11

The Behavior and Control of Wet Wire Drawing Lubricants for Copper

By Robert C. Williams,
Chief Chemist, The Ironsides Company,
Columbus, Ohio.

Introduction

ANYONE who has been close to wire drawing lubrication over a period of years has run into wire drawing jobs, which, for one reason or another, were not licked right at the start. Rarely, if ever, do any two wire mills have exactly the same equipment, lay-out and conditions. The behavior of the lubricant depends to a marked extent on certain conditions, which may be encountered.

✦ ✦ ✦

Variables in the Use of Lubricants

IT is axiomatic, of course, that to determine the effect of a single variable or change in any system, it is necessary to keep other variables constant. The lubrication engineer goes into a new wire mill, confident that his lubricant will do a good job, because it is doing "similar" jobs elsewhere with real success.

✦ ✦ ✦

THE laboratory back of his plant has assured him that his lubricant is "right" to within small manufacturing tolerances. That eliminates one irregularity, and now, all he has to worry about, in order to get optimum performance is: The condition of the water; the influence of the size and construction of the reservoir; whether the cooling capacity is great enough; the speed of drawing as related to the above; foam generation as affected by machine design and other influences.

✦ ✦ ✦

I DO not intend to convey the impression that the above variables are all critical by any means. Extreme conditions can certainly be critical. Allowances can be made to compensate for such conditions.

✦ ✦ ✦

IN a sense, these factors are not variables at all. They may be fixed conditions in any given wire mill. They would be variables as far as the lubricant people only are concerned, if their experience did not cover the particular situation.

✦ ✦ ✦

Water As A Variable

WATER may not be of fixed composition in a mill. Generally it varies between fairly narrow limits, but can and has changed abruptly and seriously in practice. Since most wet lubricants in actual use are over 90% water, it is obviously an important item. Natural fresh waters vary tremendously over the U. S. The "hardness" stated as parts per million (P.P.M.) vary from nearly 0 to 600 P.P.M., depending on the source and location in the U. S.

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WATER softened by the common municipal lime-soda process, used by many cities results in water having a hardness of 75-90 P.P.M. when handled properly. The alkalinity stated in terms of pH will run in the 9.5-10.25 bracket. We, in Columbus,

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drink this every day and apparently thrive on it. Fort Wayne's water is the same, and so is water softened by many other municipalities in the middle West.

✦ ✦ ✦

HARD water which is not softened by a city water works, is commonly softened by the Zeolite principle. This does a splendid job, if the systems are cared for and checked regularly. Water of practically zero hardness is obtained. If a really hard water gets through a Zeolite system which has reached "saturation," precipitation of the soap of the lubricant starts and the stability of the fat emulsion is affected. Clogging of dies and sticky rolls or carriers will likely result.

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IT is definitely preferable to use continuously softened water rather than to attempt to batch-soften as it is used. The incorporation of a softener into the original lubricant has its disadvantages, mainly lack of flexibility in meeting water conditions of different degrees of hardness.

✦ ✦ ✦

RARELY met, but potentially dangerous is a water supply, normally soft, which may be contaminated by acid. Periodic pH tests, coupled with a knowledge of possible acid pollution, will prevent serious trouble from this angle.

✦ ✦ ✦

Control and Influence of pH

A pH range of 8.5 to 10 for the lubricant is satisfactory in most cases. The electrometric method of pH testing is more satisfactory for all-round testing than the colorimetric method, owing to colored or very turbid solutions. There are a number of good pH meters available. These require a reasonable amount of care and checking to keep them reliable. Checking tablets are also available to test the instrument, so as to keep it reliable.

THE consequences of too low a pH are excessive copper soap formation. This, in turn, causes trouble by gumming the rolls and dies, thereby producing breaks and dirty wire. It also causes clogging of pipes, with attendant difficulties.

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IF conditions are such that normal additions of compound do not keep the pH in the proper range, additions of alkali may be required. Such additions may be necessary under abnormal conditions to maintain production. It is the lubricant manufacturer's job to design a lubricant so that normal additions of compound will take care of the pH. Such additions should be cautiously made to avoid too high a pH. Repeated additions of two ounces of caustic soda or potash per 100 gallons of lubricant solution are recommended, till the pH is in the proper range. These additions should not be made a few minutes apart, but rather a few hours apart, particularly in a large capacity circulating system.

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THE consequences of too high a pH are equally disastrous—poor lubrication and die wear, caused by inadequate lubricant adsorption to the wire and by copper dust suspension.

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IN nearly all wire mills, the pH of a freshly made up solution is at its peak. This drops with use, due largely to the effect of carbon dioxide in the air. Regular additions of compound ordinarily maintain the pH in the middle range. Occasionally, however, the pH holds up high, or even increases. This is apparently due to a combination of circumstances where the rate of drawing wire is so great, relative to the quantity of lubricant involved, that the equilibrium of the hydrolysis is pushed to yield hydroxyl (alkali ions) faster than carbonation takes place.

✦ ✦ ✦

TO illustrate with sodium stearate, a common soap:

$$NaSt + H_2O \rightleftarrows HSt^{*} + \underset{\downarrow}{Na}\ \underset{\uparrow}{OH}$$
$$Na + (OH)^{**}$$

*Stearic acid—removed as a lubricating film on the wire.

**Responsible for high pH.

$$NaOH + CO_2 \rightarrow NAHCO_3$$

(sodium bicarbonate low pH)

Rather than acidify such a lubricant solution to reduce the pH, it is preferable to use a compound which is designed to counteract this tendency.

✦ ✦ ✦

Mechanical Design Effects

WHILE various machine and circulating systems have their effect on the behavior of the lubricant, it is difficult to describe them in a general way, owing to lack of uniformity of set-up. In an earlier paper (Wire & Wire Products, Nov. 1941) the writer attempted to cover this ground in a general way and put down some principles which seemed plausible to the writer.

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THE item of excessive foaming, however, should be discussed. Foaming is more likely to occur in lubricants of high pH. In other words, low pH with attendant copper soap favors a flat solution. Other factors influence foaming, also. Dependent upon the titre of the soap or rather (the fat used in making the soap), there is an optimum temperature for maximum foam generation. In general, the higher the titre, the higher the temperature required to produce maximum foaming. The titre of the emulsified fat complicates the above simple picture where compounds containing it are used and a generalization is not easily made.

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MANY additives have been used to kill objectionable foaming. No permanent type of "foam killer" is recommended. Kerosene is of this type and if too much is employed the favorable detergency of the lubricant may be de-

(Please turn to Page 805)

Convention Sidelights

By the Special Correspondent

Some observations on the Annual Wire Association Convention held at Pittsburgh, Pa., October, 1944.

THE solo flight of the Wire Association just ended set up an impressive flock of superlatives; for example, biggest registration, best attended sessions, finest luncheon, smallest annual meeting, and purest smoker (type-setter, don't trip up on that adjective). If doubt ever existed that the Association gained little or nothing by leaning up against any other organization, it was effectively dispelled this week. The writer half expects to see in an early number of a certain technical journal, heading the personal column,

"W. A., please come back, it was all a mistake, can explain everything. Miss you terribly darling. A.S.M."

✦ ✦ ✦

BEING charged expressly to comment on the technical sessions the Special Correspondent wishes to state the conviction that Mr. Spruance's remarks on inhibitors exhibited some masterly examples of effective understatement. Any old timer who remembers, as does the S. C., that every time he blew his nose in the cleaning house he snorted two holes through his handkerchief will agree. Optimists used to point out that workers in the cleaning house never suffered from respiratory infections; they neglected to mention the reason, that after a few days on the job the respiratory tract disappeared.

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SAVING steel and acid was a worthy purpose as was also bringing a bit of sunshine, and cheer to the workers, but the big job inhibitors did was to open up the cleaning house, as Colonel Gorgas opened up the Canal Zone, to the white man.

MR. Edinga, in discussing ultra fine wires, took us into a realm as fantastic to the average wire man as Alice's Wonderland. How you can look at a wire you can't see and feel of a wire you can't feel is beyond the scope of the Special Correspondent's imagination. What can a wire man think of a world in which, instead of ordering so many pounds of wire you order so many ohms of resistance, and they hand you wire which you're not supposed to gauge! The Special Correspondent cornered Mr. Edinga after the meeting and asked how to estimate the size of a wire too small to mike. He says you cut off a piece and throw it up in the air and if it comes down it is too coarse. He also told the S.C. that inspection for surface defects was done by gremlins, but as the room was noisy and Mr. Edinga has a very slight accent maybe the S.C. got this one wrong.

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THE non-ferrous session brought out the best discussions of the week, an odd thing when one recalls the Quaker meetings of other years. This brings up a subject for debate. Many of us look back with nostalgic yearnings to a few meetings directly after Ralph Clifford had sold us the idea of pure discussion. We touched a high spot there that we can't seem to approach now. Why is it? People used to come in from the other societies just to see the fun, even though they didn't know what it was all about.

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THE S. C. was frequently a chairman in those days, and thinks he has a right to an opinion. In the first place, we didn't allow a paper to be read from the desk. There is nothing more soporific than listening to a paper you have already read. Then the papers were published a month ahead. The chairman had a preview even earlier, and he studied the paper and framed up and sent out to certain members lists of topics suggested by the text, and questions he would like to have discussed, and asked them to be ready.

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POSSIBLY one difficulty is that as the membership expands it is harder for any chairman to know a large percentage of the attendants. But the S.C. wonders if a great deterrent factor isn't that damned stenographic record. Some people are gifted with orderly thoughts and fluent speech, but the mind of the average man, including that of the S. C., bears a strong resemblance to McGee's hall closet. When he opens his mouth everything falls out at once. He hates like hell to have the stuff played back to him a few weeks later, if indeed the stenog. got it. Especially does he hate to jump up, all hot with an idea, start to spill it, and then be stopped and made to yell his name three or four times to the recorder, and maybe spell it. He feels as if a desk sergeant was booking him for disorderly conduct, and by the time he is allowed to go on, the heat has all died out of him.

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THE S. C. used, in the old days, to sit right at the recorder's ear, whisper the names of the

speakers, and spell out all the long words, but in these days the S. C. is too lazy, misses too many sessions, and doesn't know the new members well enough to function that way. He suggests again, as he has suggested before, that we forget the whole thing, fire the stenog., and let those lazy hounds who don't come to the sessions whistle for their information.

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THE Special Correspondent would like to comment on the discussions, but the truth is that every time he went to a session he was spotted by a friend, a client, or a chiseler, and dragged out into the hall. As a matter of fact he heard about 10 minutes of discussion all week. The reader can therefore imagine his delight when on Friday morning he caught sight, in the lobby, of his old friend and patron Mr. J. J. Whoosis, often spoken of as the Spirit of Wire. The Old Master looked fairly fit, despite the prison pallor and a considerable loss of weight. The S. C. rushed to greet him and the following dialogue ensued:

S. C.—Mr. Whoosis, you don't know how delighted I am to see you again. Are you out?

J. J.—Hello Junior, glad to see you. No, I'm not out in the usual sense of the word, I'm just out briefly on a writ of habeas corpus: hearings before a federal judge. It seems that on my late abortive escape I crossed a state line and they're trying to frame me on the Mann Act. You see this worthy fellow just behind me, the stocky man with the thick soled shoes and the derby hat that has the appearance of having been set in place with the aid of some precision instrument, let us say a theodolite? He chaperones me on these little outings. By the way, he sticks as close as though we were connected by an umbilical cord, so if you have anything interesting to say, come in close and keep your voice down.

S. C.—Mr. Whoosis, I know I speak for the entire membership in expressing to you our sympathy in that deplorable miscarriage of the tunnel scheme. I thought you would surely pull it off. How did it fail? That's not like you, Mr. Whoosis, if you'll pardon my saying so.

J. J.—Let it be a lesson to you, Junior, as it has been to me, against over-confidence and failure to double-check. The catastrophe was due to the interposition of Fate in the form of one of the meanest of God's creatures, the common house fly, musca domestica. She, in the innocent performance of a natural function, unwittingly inserted a decimal point where no decimal point should have been, and threw all my calculations off. When I thought we were passing under Trenton it was really Lambertville; when we should have come up on the Newark marshes, where a speed boat awaited us on the Passaic river with a change of clothes and forged passports with a vise' for Costaragua, we came up in Tuxedo Park.

S. C.—Couldn't you have carried on from there?

J. J.—Noblesse oblige, my boy. In the veins of every Whoosis flows the blood of William the Conqueror. When we saw we were in Tuxedo Park we did what any gentleman would have done; we dashed back to Pennsylvania for our Tuxedos. And now observe the whimsical workings of Fate. We had come up on the estate of Mrs. Schuyler Van Snapgirdle. During our brief absence Meadows, the butler, came out into the shrubbery to bury half a dozen cans of caviar which he had picked up on the black market. His spade broke through our roof, and when we got back the Law was waiting!

S. C.—Wasn't there some unpleasantness about a guard?

J. J.—There was, indeed. My own carelessness, too—I should have squared that guard and I didn't. After the incident I did everything in my power to make it right. I placed on the warden's desk his resignation in his own handwriting, with the explanation that he was obliged to start for New Zealand at once to claim a legacy from a maiden Aunt. On top of it I placed his badge and his revolver, which by the way, I forgot to clean. Wouldn't you think that would convince an honest man? But there is a mean, low, suspicious type of mind that is all too common among the executives of our penal institutions. It is a trend which I deplore, and which I maintain bodes ill for the future of America. My little effort was ill-received, and the ensuing treatment accorded me ruffled my dignity.

S. C.—How do you mean, ruffled?

J. J.—Well, if you must know, with a piece of rubber hose. They were determined that I knew where the guard was, and they interrogated me for three days and then threw me in pokey.

S. C.—Pokey, Mr. Whoosis?

J. J.—Yes—Pokey—the black hole—dampness, slime, spiders, rats, bread and water—you know the routine.

S. C.—We heard that there was talk of trying you for the—well, the disappearance of the guard.

J. J.—Yes, but there was no corpus delicti, and there won't be.

S. C.—You are quite confident?

J. J.—Brother, you don't last many years in the consulting racket if you don't know how to cover up your own mistakes. Have no fears, Junior, there will be no body.

S. C.—I marvel that you can take it all, Mr. Whoosis, and keep your poise.

J. J.—It's the blood of the Conqueror, my boy. Listen: I want to recite you a little poem I wrote—no, no, don't go away, I shan't be a minute. Stop fidgetting; I'll let go of your lapel as soon as I've done reciting. Ahem.

Out of the slime that covers me,
Out of this dark and dismal hole,
I thank whatever Gods there be
For my inconquerable soul.

Beneath the whistling garden hose
I neither winced nor cried aloud
I scorn to yield to vulgar blows,
My head is bloody but unbowed.

Beyond this vale of blood and tears
Looms but the shadow of the Chair
Yet the fell menace of the years
Fnds, and shall find me debonair.

It matters not how strong the gate,
How slim the chances of parole,
I am the master of my fate,
I am the captain of my soul.

S. C.—That's damned fine, Mr. Whoosis, but why does it sound so familiar to me? Can I have heard it before?

J. J.—No doubt, Kid. It was published, in our house organ "Bars and Stripes," of which I have the honor to be literary editor, when I am not in pokey, and it has doubtless been copied. You know we who are wards of the nation are denied the courtesy of copyright. Mark my words, boy, that bit of verse has got the stuff that endures. Before you die you'll see it in the anthologies, probably attributed to some minor Elizabethan poet.

S. C.—It's certainly a gripping piece of literature. One gets from your very restraint a lively sense of the horror of your position. It must have been frightful in the Black Hole.

J. J.—Yes, it was irritating. The rats I didn't mind, I've been working with rats ever since the Wagner Act was passed. Spiders leave me cold, and I stand the dampness well. But there was one bit of cruelty so refined as to smack of the Holy Inquisition. On the wall across the corridor, where a feeble gleam of pale light filtered in, there leered at me from a lithographed poster a face and cigarette holder that typify all that I loathe and despise. Even through closed eyelids I could see that ghastly leer—a horror to heighten horror! I don't mind confessing that if a compassionate turn-key hadn't torn it down for me I should have had a spell of the screaming mimis. It is a comfort to me to know that in the future no wretched soul in pokey will ever conceivably be subjected to that particular form of torture.

S. C.—You mean—?

J. J.—Yes, son, it's in the bag; that face is about to be turned to the wall.

S. C.—Oh Mr. Whoosis! If you're only saying that to cheer me up, God bless you anyway, I love you for it, but can you really mean it? Can I quote you?

J. J.—Quote your head off. J. J. Whoosis is putting his neck right out. I'm afraid by the time this reaches your readers the ship will have sailed, but pass it on by word of mouth.

S. C.—How do you figure it?

J. J.—I see two influences at work for our salvation. I don't think the common mind is any more enlightened than before, but it is just getting tired of the encumbrance. People figure that what he has been throwing into the trough is theirs by right, and they'll screw it out of any president. Old man Demos is a fickle old fool, you know. He'll pick you up through a whim, and throw you down just as quick when he's bored. Remember Aristides, the finest administrator Athens ever had, who was kicked out of office and chased out of town, and an analysis of the votes showed that people were just tired of hearing him referred to as "Aristides the Just."

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THEN there is Dewey, too. Don't forget him. Notice how he started the campaign? He met the state chairmen, the county chairmen, and for all I know, the ward and precinct chairmen—The boys that wear out their shoes rounding up little Republicans. Other candidates in recent years have ignored them and spent the summer performing Terpsichorean solos when they should have been training the chorus.

S. C.—Pardon me, Mr. Whoosis, if I suggest that the general opinion, as reflected in the betting odds, is opposed to yours.

J. J.—When you've lived as long as I have, sonny, and seen them go up and seen them come down, you'll realize that nobody is ever able to figure the champion as a loser. There's something deep in human nature that tells us, quite illogically, that because a man has never been knocked out he never will be. Remember Dempsey? Remember John L. Sullivan? Remember Jeffries? All top-heavy favorites to the end. Many a time have I seen a champion prance into the ring, snorting for blood, "Killer" written all over him, and half an hour later some faithful follower was combing the rosin out of his hair.

S. C.—Mr. Whoosis, you've made me so happy, I wonder if you'd do a small favor to make this a perfect day. I'd like to have your impressions of the convention.

J. J.—It was the foulest, rankest, phoniest convention I ever followed. Think of the colossal assurance, the immitigated gull, of pretending that he was drafted! I tell you, Junior, it'll be happest day—

S. C.—No, no, Mr. Whoosis. I don't mean that one—I mean the Wire Convention.

J. J.—Oh—that! Why, I thought it was a right good one. I enjoyed the smoker immensely. I always told Doc. Braley he would lose his shirt if he hung around with Clem McGowan. As for Clem it's always a treat to see him on the boards. How a man can be so smart and look so dumb will always puzzle me. The stage lost a great actor when Clem took up wire drawing. I slept well after that show, too, which is unusual. We old guys like our sleep.

S. C.—Could I have your comments on the technical discussions, Mr. Whoosis?

J. J.—Well now, son, I'm sorry, you see the rooms were warm and the chairs soft; that is compared to my fine bench, and every time I woke up the discussion was just closing. Now I must run along. This worthy fellow who is kind enough to act as my courier is getting restless; it's past his tea time. I can't invite you to call while I'm in pokey, but eventually they'll stop this tiresome fussing about the wretched guard and put me back in the library. I've got the catalog hidden, and the inmates are raising hell already. Come and see me then. Of course after November 7th my pardon will be practically automatic, but the time lag will probably hold me a week or two. Drop in. Good night, and remember me kindly to your editor.

Notes On Convention Technical Papers

By Richard E. Brown

A digest of the many interesting production helps brought out in the discussions on the papers presented at the Wire Association Convention at Pittsburgh, Pa., October, 1944. ✦ ✦ ✦ ✦

LECTURE: "Safety in Wire Mills"
R. H. Ferguson, Manager of Safety, Republic Steel Corporation, Cleveland, Ohio

IN discussing the subject Mr. Ferguson stated that improvement in the injury rates of rod and wire mills since 1929 has not kept pace with the reductions attained in some of the other major departments. The decrease in frequency rate during past years has amounted to 41 per cent in rod and wire mills whereas this rate is down 78 per cent in sheet mills, 62 per cent in open hearth, 60 per cent in general mechanical and 54 per cent in pipe mills. The net reduction in severity has been 38 per cent in rod and wire mills since 1929 in comparison with decreases of 72 per cent for sheet mills, 81 per cent for open hearth and 55 per cent for blast furnaces.

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THE speaker further stated that successful safety programs have been established on the premises that safety is management's responsibility and is an operating problem as well. He stressed the importance of building plants with the safety and well-being of the working personnel in mind, and claimed it is just as simple to construct a plant the right way as to build dangers into a building and operations which a little foresight could have eliminated. To do this job representatives of engineering departments sit down with the safety man and review the best known practices, check the safety codes, both state and national, and agree on the structure to be recommended. Blueprints are checked for safety and for legal requirements of the jurisdiction in which the plant is located.

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TOO many times in the safety field all of the educational work is directed towards the man on the job. Leadership for safety must come from management. The program must have the active attention of the top flight officers. Lip service alone is not sufficient. The speaker suggested a safety organization be set up to fit the particular plant. One man should be made responsible for the program. This man should report directly to the plant manager.

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HE stressed the vital importance of the use of practical safety rules for the plant and recommended that these safety rules should be in the form of safety instructions. Safety rules should be explained so that they are thoroughly understood. Only when this is done can proper enforcement and intelligent application be attained.

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THE speaker also cited the importance of the workmen wearing goggles when placing wire around bundles. He pointed out that last year six accidents were experienced where the bundling wire flew up and hit men in the face. Because the men wore goggles there was no loss of eyes.

PARTICULAR emphasis was placed by the speaker on a thorough and regular plant inspection for safety conditions and poor practices. It is imperative, he said, that such situations be corrected promptly. Routine inspections by the plant safety man in company with the departmental superintendent and foreman have a definite effect on the reaction of personnel. When correcting poor practices, supervisors must be fair and just. It serves little purpose to correct a practice if a bad taste is left in a man's mouth and the reasons for changing a practice are not explained to him in full detail.

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IN discussing Mr. Ferguson's paper, one wiremaker pointed out that industrial relations will become more pertinent in the future. Large companies have been rather slow to take up the cause of safety; smaller concerns have been more active in this connection.

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DISCUSSION also brought out some important methods of handling cold-rolled bars. At one mill canvas rubber belts with links inserted at each end are employed for this purpose, handling one ton at a time. At an eastern plant, braided rope suspended from a bar at each end of the lift is employed for this purpose.

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LECTURE: "Handling Wire Mill Labor Problems"
John J. Sanderson, Asst. Supt. Wire Mills, Keystone Steel & Wire Co., Peoria, Illinois

MUCH has been written and said recently concerning the qualifications of a foreman. The expression, "Give me a man with a head full of common sense and plenty of guts, and he will make a real foreman", covers the qualifications for one holding this position. This opinion was expressed by John J. Sanderson, assistant superintendent of wire mills, Keystone Steel & Wire Co., Peoria, Ill., in discussing the subject of "Handling Wire Mill Labor Problems". In our mills, he stated, more than 95 per cent of the foremen have been in supervisory capacity for five years or more. Every one of them has come up through the ranks within the mill. They understand the workings of the organization, and know they have the backing of their immediate superior, as well as management. They are expected to meet production schedules, and keep the morale of their employes high. Their main headache has been absenteeism. Checking the absentee personally by telephone, he emphasized, has done more to straighten this out than waiting for the man to get back on the job.

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MR. Sanderson, in alluding to the frequently heard phrase of playing "favorites" with workers, drew attention to a system operating successfully in his plant which nullifies such a condition. He explained that two departments have a "bidding system", where each employee in his respective department is given a sheet of paper on which all jobs are itemized. The employees bid on all the jobs, listing their choices in numerical order. These are turned in to the department office at a designated time, and are filed according to seniority. Inasmuch as seniority and fitness for the job are the governing factors, the schedule is made with the senior men getting their choices, and so on, until the schedule is completed. Other departmental foremen are now trying to install the same system. No "favorites", he contended, can be played by this bidding system.

PAPER: "Cleaninghouse Practices"
F. P. Spruance, Vice-President, American Chemical Paint Co., Ambler, Pa.

IN speaking on "Cleaninghouse Practice", Mr. Spruance stated that the removal of scale from wire, other than stainless, still is accomplished in sulphuric acid baths varying in strength from 3 to 12 per cent by volume. However, concentrations of from 5 to 7 per cent by volume might represent a fair average for wire pickling. Temperature as well as concentration is utilized in controlling the speed of pickling. The acid activity of a bath of given concentration can be quickly increased or decreased by raising or lowering its temperature, each change of 20° Fahr. will approximately double or halve the activity. Temperature also has its effect on the nature of the pickled surface and while high temperatures, even in relatively strong baths, have little harmful effect on low carbon steels, high carbon and alloys are better pickled and freer from smut at relatively low temperatures.

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MR. Spruance pointed out that the use of inhibitors ushered in a new pickling era. Full advantage, he pointed out, can be taken of improved inhibitors and their ability to minimize the attack of acid on metal and markedly reduce the absorption of hydrogen with its resultant embrittling action.

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THE use of strong inhibitors, stable in hot acid baths, has been a factor in reducing the embrittlement of pickled wire to an extent that rapid drying of the limed rods is now accomplished in flash bakers, instead of in the slower tunnel ovens formerly required to expel the occluded hydrogen.

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THE optimum amount of iron to be tolerated in the bath varies. In general, however, when the bath has dissolved approximately one-half pound of iron per gallon (approximately 6 per cent), it is good practice to discontinue the addition of acid and inhibitor, to raise the temperature of the bath to offset the slowing action of its increasing iron and decreasing acid, and to pickle as long as possible to reduce the acid as low as possible before the bath is discarded. Pickle supervisors often do, and always should, keep a running log for each acid tank.

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PICKLING of alloy steels, he stated, has been markedly improved by a single addition of from 5 to 20 pounds of rock salt to each 100 gallons of the usual sulphuric acid bath. Muriatic acid (20° Be.) in the amount of from 1 to 4 per cent by volume would have the same action. Salt is used because it is cheap and usually on hand.

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ADDITION of salt to a sulphuric acid bath used to pickle chrome vanadium steel, for instance, markedly improves the pickling. It is even more noteworthy that if, in addition to salt, a strong inhibitor designed for use in such baths is also added, overpickling is substantially prevented. The metal loss and, of course, the acid consumed are minimized and a smooth, fine crystalline surface is obtained.

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IN conclusion he announced that a chemical treatment of rods will be developed that may so modify the nature of the scale that further economies and greater pickling speed will be obtained. Encouraging work is being done along the latter line. Alloy steel forgings now are being treated in the heat treating process with the result that scale is loosened sufficiently to flake off almost completely when the treated forgings cool. More work is required to adapt this process to the treatment of wire rods or to the furnaces in which they are treated.

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D. D. Buchanan, manager of operations, Union Drawn Steel division, Republic Steel Corp.,

Massillon, Ohio, in commenting on Mr. Spruance's paper, stated that little attention has been given to the cleaning house during past years. If the steel is not cleaned properly, he warned, a wide variation in the coating and trouble with the dies will occur. Poor cleaning gives a poor bond, he contended. In many plants the pickling room is placed in any old spot; it seldom is painted, floors are in bad condition and there is little incentive for the operators to turn out a quality product. He described a new pickling room installed at Republic's Hamilton, Ont., plant Dec. 30, 1942, with its walls of white and border of battleship gray, and stated that it has not been painted since then. The employees are proud of the installation, he continued, and their increased interest is reflected in the maintenance of equipment and betterment of product.

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FURTHER discussion of cleaning house practices prompted one wiremaker to assert that copper coating high-carbon patented rods with Cuprodine at his plant led to a rapid wearing of the dies, though he qualified his statement by saying that the lime coating may have been too heavy or too light, or the baking might not have been right. On the other hand, Mr. Spruance pointed out a marked increase was noticed in die life when Cuprodine was used on cartridge case steels of 0.10 to 0.15 per cent carbon.

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A POINT raised by another wiremaker was that in his cleaning house the acid-resisting bronze hooks wear away at the acid level line much faster under present practice than they did a few years ago. A wire mill superintendent from the middle west cited the same trouble at his plant, pointing out that it recently was necessary to discard a hook in use 14 months because of holes at the acid line of such diameter that a lead pencil could be inserted therein. He attributed the trouble either to an incorrect mixture of nonferrous materials or an incorrect method of mixing. He suggested putting more lead in the nonferrous material from which the hooks are made and added that the hooks will not be as strong but they will render longer service.

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ANOTHER question raised concerned the point in the iron concentration of the pickling bath at which acid should be added. Mr. Spruance answered by pointing out that when the iron content of the pickling solution is around 6 per cent, the acid activity is slow. He saw no advantage in an acid addition at this point and laid stress on the fact that considerable acid can be wasted by adding it to a bath that is dead.

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PAPER: "A Reappraisal of Electro-Galvanizing"

Ernest H. Lyons, Jr., Chief Chemist,
The Meaker Company,
Chicago, Ill.

UNIFORMITY of electrogalvanized coatings on wire is much more perfect than present tests can detect, Mr. Lyons stated in presenting a reappraisal of electrogalvanizing process. The speaker candidly said that the uniformity of the electrogalvanizing process falls far short of perfection. This, he explained, is in the variation from strand to strand across the galvanizing tank. If the wires are all held at the same distance from the anodes, and with uniform spacing between them, and the electrical contacts to the wires and anodes are all good, then there will be no variation in coating from strand to strand. This condition is not always obtained in practice. The cast zinc anodes are not perfectly uniform in height, and some of them dissolve slightly faster than others, so that the anode surface is not entirely uniform. Some strands of wire tend to "ride" higher than others, and contacts are not always perfect. Such variations largely average out as the wire proceeds through the galvanizing tank, but small differences in coating weight may persist.

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OPERATORS quickly learn how to place the anodes so that these variations are held to a minimum. It is not unusual for the strand-to-strand variation to be less than 2 per cent across the machine. It ought not to exceed 4 per cent under all operating conditions, and only with the most careless or unusual manipulation has it risen as high as 10 per cent.

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THE speaker cited a few small losses of zinc in electrogalvanizing. A certain amount of the zinc electrolyte is carried out on the wire and rinsed off. In one large installation this drag out loss was determined to be about 4.6 gallons in 24 hours based on 40 wires. This amount of solution contains about 3.1 pounds of zinc, which was wasted down the sewer. During this period, 63 tons of wire were coated with 3700 pounds of zinc. The dragout loss amounted to about 0.084 per cent of the zinc consumed.

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ANOTHER source of loss is the metal plated on contacts and other portions of the machine, since some current leakage is not avoidable. It is not possible to calculate this loss, but it was estimated at less than 5 pounds per day. Together the two losses did not exceed 0.21 per cent of the zinc consumed.

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WHEN the anodes become very thin, they are piled on top of fresh anodes and are consumed. A few of the very thin remnants of anodes may slip off and fall to the bottom of the tank, where they are slowly dissolved by the acid in the electrolyte, so that this zinc is not lost but helps to replace the dragout losses from the bath. The utilization of the zinc is therefore well over 99 per cent.

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ELECTRODEPOSITION of heavy coatings (2 to 3 ounces) is somewhat more difficult practically than the deposition of coatings of 1 ounce or less. Difficulties will be encountered if galvanizing solution is not perfectly clean and in a well balanced condition. Some-

times it will be necessary to slow down somewhat until the solution is filtered and the pH adjusted for the best results. More often, heavy coatings are applied as easily as light coatings, by simply setting the controls properly.

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THE speaker emphasized that an annoying source of trouble encountered recently was contamination of the electrolyte from the rubber lining of the tank. During the war, he said, many new rubbers have been used and a few of them caused rough brittle coatings. Importance of an alkaline cleaner before the pickle to maintain the best operation has been found to save pickling acid.

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ONE of the most interesting applications of electrogalvanizing has been in coating wire before it is drawn down to finer sizes. The electrogalvanized coating is not damaged in the least by this operation, but is reduced in direct proportion to the reduction of the wire. It is more economical to handle the wire through the galvanizing in large sizes, and draw it down afterwards, than to galvanize the long lengths of fine wire. Drawing after galvanizing also gives a harder stronger wire. The zinc is a good die lubricant and drawing at high speeds is possible, with very little wear on the die, when the proper technique has been learned.

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IN the discussion of Mr. Lyons' paper, one wire producer wanted to know if lubricants adhering to the surface of the wire to be electrogalvanized resulted in a black product or a poor bond. The author pointed out that if a wire is not clean upon entering the electrolyte, the coating will not adhere. He also warned that in starting up after a shutdown of many hours the solution often is cold and in this state it will not carry the full current with the voltage available. This invited the question, "Could the process be speeded up by applying some form of heat to the bath?" Mr. Lyons agreed that a steam coil used in the storage tank would be entirely satisfactory and that the line could be placed in normal service shortly thereafter.

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PAPER: "Some Factors Influencing the Drawing of Fine Wires"

H. P. Edinga, Factory Manager,
Wire Division,
North American Philips Co.,
Dobbs Ferry, N. Y.

MR. H. P. Edinga in speaking on "Problems Influencing the Drawing of Fine Wire", pointed out that practically the same problems are found as in drawing heavier sizes but the difficulties involved are more accentuated. Blow holes will start giving trouble not in the heavier drawing stages but later in the small sizes.

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IN order to produce economically, it is desirable to use multiple drawing machines. An exception here is the drawing of tungsten which is done on single die drawing units. The generally used machine with straight rolls can be employed in most cases.

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HOWEVER, when drawing down to 0.001-inch, experience has proven that this machine has some undesirable qualities. First of all, it is better to use a stepped drum in order to decrease slippage which in some cases is detrimental to surface quality. The arrangement of these rolls, vertical, horizontal, or at an angle, is immaterial. Fine wire, instead of slipping over the wet drum, has a tendency to stick to it causing breakage. In case of dry drawing, with the lubricant applied in the die holder, the drums must be very hard, well polished, and well cleaned.

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IF a diamond does not fit tightly in the casing, lubricant may seep through and stick to the wire after it has passed through the die. This in turn, if only slightly, will moisten the drums, causing a break of the wire. Cleanliness during operation is of paramount importance. Lubrication is one way of protecting the dies. Another way, particularly if the wire to be drawn is of the hard wearing kind, is by covering the wire with some soft material. For instance, a stainless steel rod can be mounted in a copper sleeve and after the whole assembled rod is drawn down in wire, the copper tube can be dissolved.

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WHEREAS three years ago the output per die was about 1 to 2 pounds, recently averages of 5 pounds are possible and in individual cases, 20 pounds for a single die (in the size, 0.0013/0.0014-inch) has been reached.

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PAPER: "Physical Properties of High Carbon Steel Rope Wire as Affected by Variations in Patenting."

H. J. Godfrey, Development Engineer,
John A. Roebling's Sons Co.,
Trenton, N. J.

MR. H. J. Godfrey in speaking on "Physical Properties of High Carbon Steel Rope Wire as Affected by Variations in Patenting", brought to the attention of wiremakers that patenting has a definite effect on the physical properties of high carbon rope wire and the process may be controlled to give either high torsions or high reduction of area and bends. If all of these properties are required at a given tensile strength, a compromise in each of the ductility values will be necessary.

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PAPER: "Carbide Dies"

A. R. Zapp, Manager, Firthaloy Div.,
Firth-Sterling Steel Co.,
McKeesport, Pa.

THE outstanding characteristic of carbide cold heading dies is long life before wearing oversize. This fact was brought out by Mr. A. R. Zapp, manager, Firthaloy division of Firth-Sterling Steel Co., McKeesport, Pa., in speaking on "Carbide Cold Heading Dies". He pointed out that a heading die for countersunk aluminum rivets, 5/32-inch diameter, produced 19,000,000 pieces without having worn more than half its useful life when it had to be removed from

the machine on account of premature failure resulting from an accident.

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MR. Zapp pointed out that until recently the use of carbide heading dies was limited largely to products having $\frac{5}{16}$-inch diameter or smaller but that development work now is being carried out on bolts up to $\frac{7}{8}$-inch diameter. These tests indicate that carbide heading dies are practical for the larger sizes of bolts.

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SUCCESSFUL operation of carbide heading dies, he stated, depends upon the careful observance of such factors as properly heat treated wire, good coating on the wire, well maintained heading machines, skilled operators, good cut-off, and proper die proportions.

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THE speaker warned that good first station extrusion in progressive types of machines is a prerequisite for proper heading and extrusion in the second station. Carbide extrusion dies used in first station extrusion resists the tendency to gall or pick up material from the bolt. He warned that if such galling occurs, the coating is scraped off the wire and galling naturally develops in the second station die. This results in high temperature stresses which may lead to heat checks and flaking of the nib and failure of the die.

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STANDARD nibs have a definite relationship of outside and inside diameters and the speaker warned that any appreciable reduction in the nib diameter weakens the nib. The ability to absorb shock, Mr. Zapp explained, is a function of the volume which in turn is proportional to the diameter and length of the nib. Unsatisfactory performance will result if the nib diameter is reduced to suit limit casing diameters. He recommended an increase in the diameter of the hole in the die block to provide maximum casing diameter.

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WHEN the length of the carbide nib is greater than that of the product, the product then is confined entirely within the nib, but despite this condition, manufacturing difficulties and die cost limit the length of the nib. However, for relatively long bolts hardened steel bushings beneath the nib now are employed to provide wear resistance. Mr. Zapp stated these bushings have been found satisfactory inasmuch as they resist the wear in the knock-out pin end.

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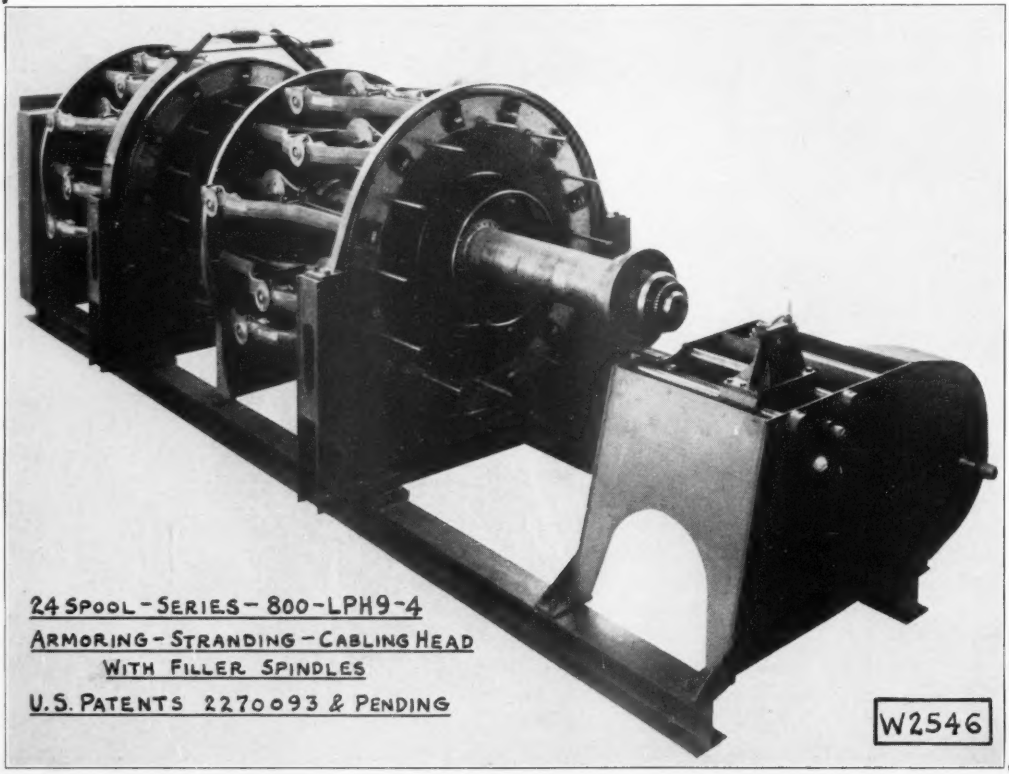
IN conclusion, Mr. Zapp drew attention to the fact that whenever first station dies gall, faulty

(Please turn to Page 793)

THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY, U.S.A.
ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY



SERIES 800 "LPH" PLANETARY HEADS.
* * *
CRADLES:
FLAT TYPE RETRACTING PINTLE.
ANTI-SLAP.
INTEGRAL TENSION
1:1 RING-BACKTURN.
STAGGERED CIRCLE.
ANTI-FRICT. BEARING.
* * *
ROTOR:
ALL STEEL
BALL BRG. ROLLER-SUPPORTS.
* * *
GEARING:
ALL STEEL
CHANGE & REVERSE.

Advisory Committee Recommendations

A digest of the reports of the Brass Mill Advisory Committee, the Wire Rope Advisory Committee and the Committee on Small Diamond Die Research. ✦ ✦

Some Recommendations Made By The Brass Mill Advisory Committee

Over-All Brass Mill Production

JULY production was disappointingly low, primarily in rod and strip. However, a preliminary check shows August production to have been most satisfactory.

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NEW STRIP FORECAST—Certain revisions in the strip forecast for the remainder of the year have been necessitated, due to altered requirements for small arms and artillery ammunition strip. However, production for the remainder of the year should continue at a rate of approximately 275,000,000 pounds monthly, unless the war ends in Europe.

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ROD FORECAST — Combined Army and Navy requirements will remain approximately the same, with slight decreases expected in the artillery program, due to changes in unit weights. The expansion program started in May is well ahead of schedule. As a result, production in August reached an all-time high of approximately 94,000,000 pounds. Due to the rapid expansion, it is planned to gradually relieve the pressure on rod mills. It is further hoped that warehouse stocks, in the near future, can be further built up. The rod outlook for the latter part of the fourth-quarter appears to be satisfactory.

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ROTATING BAND PROGRAM —The rotating band expansion program, started a few months ago, is now coming into production, and Army and Navy schedules are approximately in balance, except for a few special large-sized bands, for which additional expansion is now under way. The outlook appears to be satisfactory on this program.

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THE Copper Division has recommended the revocation of Order M-9-c and other orders prohibiting and restricting the use of copper, immediately following cessation of hostilities with Germany. The recommendation is based upon the assumption that military demand will shrink to such an extent that the remaining supply of copper will be sufficient for civilian production.

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TWO charts have been prepared forecasting production of all brass mill products and of brass strip during the period between V-E Day and V-Day (Victory in Japan), and following full victory. Both charts list average monthly production from 1935 through 1943, and monthly production in 1944 through July, with estimated production throughout the balance of the year, based upon continuation of war in Europe. The charts then extend estimated essential production for a period of twelve months following cessation of hostilities in Europe, and prior to total victory (V-E to V-J Day).

THE overall chart shows that, from a present monthly requirement of approximately 450,000,000 pounds, essential demands will probably shrink to approximately 275,000,000 pounds monthly, following V-E Day. This will leave substantial open capacity for production of civilian goods. However, the capacity must be adjusted to the type of product required in a civilian economy and to the amount of copper available.

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STRIP production will shrink from an average monthly production of 275,000,000 pounds following V-E Day, to approximately 140,000,000 pounds per month. The operations of Plancors may be reduced to 20,000,000 pounds per month during this period. This minimum production is necessary, in order to keep sufficient capacity in stand-by condition. However, the Army is agreeable to absorb from commercial mills that quantity of ammunition strip which they cannot produce along with civilian orders.

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Reconversion

ON August 15 spot authorization procedures were issued as a part of the WPB's preparation for reconversion, committee members were told. Under the plan, which is set forth in Priorities Regulation 25, manufacturers may obtain permission from WPB field offices to produce certain articles for civilian consumption provided that manpower, facilities, and materials are not needed for the war effort. The Copper Division plans setting aside 1,500,000 pounds of Copper wire and cable for the

Fourth Quarter to be used exclusively for spot authorization. However, because of the large military demand for fine wire and strand, there will be restrictions which will limit the types of wire and cable for which such authorizations may be issued.

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Fine Wire

COMMITTEE members briefly discussed a definition of fine wire, as used in the spot authorization program. It was suggested that fine wire should be defined as No. 25 B and S gauge and finer.

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Small Diamond Die Research

RESULTS of a research that is leading to improved production of diamond dies for electronic equipment manufacture were revealed this week to members of the Small Diamond Die Industry Advisory Committee, the War Production Board reported today.

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DIAMOND dies for producing wires of spiderweb fineness will be manufactured more quickly and economically by new electrical methods, when finally reduced to commercial practices, according to Bureau of Standards scientists who performed the research under WPB auspices.

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BESIDES reporting better methods for producing diamond dies, scientists divulged details for drilling the precisely-shaped, minute hole in a diamond by means of an electric spark shot from a platinum needle while both are immersed in a chemical solution. As auxiliaries to this process, commercial drilling and polishing also are employed.

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ELECTRONICS, vital both to wartime and peacetime communication, depends on superfine wires, which can be drawn only through microscopic apertures drilled in diamond dies, a WPB official explained.

NEW methods of producing and grading diamond powder were also being given to industry, it was announced at the meeting. These methods were developed in projects initiated by WPB. One Bureau of Standards scientist described the process. He said that a standard specification to eliminate the irregular and sometimes misleading grade numbering had been worked out at the bureau. Most powder manufacturers had indicated that it would be adopted, he reported.

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PRODUCTION of superfine drawn wire (.0015-inch and smaller) increased about 11 per cent in the first six months of 1944, over the same period in 1943, although only 58 per cent of the number of dies was required to draw the greater quantity of wire. This indicates improvement in die manufacture, and the efficient utilization of dies by wire drawers, WPB officials said. Allocation of dies for drawing superfine wires should be continued by the Government, committee members urged.

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SEVERAL wire manufacturers expressed a willingness to make tests to ascertain whether Brazilian diamonds produce superior, though more expensive, dies than those made from South African diamonds.

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Wire Rope Advisory Committee Discussions

Purpose of the Meeting

THE **Wire Rope Industry Advisory Committee** met for the first time on August 17, 1944, to discuss (1) the extent to which the use of fine wire should be restricted in filler wire seale constructions, independent wire rope centers, constructions with 37 wires or more per strand, and 6 x 19 deck lashing ropes so as to extend production of wire rope and (2) the most practicable and effective methods for increasing the supply of wire rope. Engineers from eight of the companies represented on the committee had been invited to assist on technical aspects.

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Statement of the Problem

IN spite of the fact that production of wire rope has already been multiplied to almost the optimum possible with available manpower and facilities, fulfillment of military demand is still about 3000 tons a month short. Since further extension of wire rope production is practically impossible if present constructions are maintained, methods must be found for modifying these constructions so as to extend available wire production to a greater footage of rope. Lack of sufficient manpower has prevented any material increase in the amount of fine wire that can be furnished to nonintegrated companies. Substitution of heavier wire would relieve the shortage of fine wire, which is the most serious problem.

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Practically 75 per cent of all the companies constituting the wire rope industry have sought WPB assistance in obtaining more fine wire. Integrated as well as nonintegrated companies are seeking wire from high-carbon wire mills, and some companies are requesting relief from their FC allocations. The release of fine wire from present constructions is therefore of eminent importance. The principal problem at the moment is in assisting wire rope companies in obtaining more wire from .014 through .045. Lack of sufficient wire production has forced rope mills to accept one size from one mill at one time and another size at a later date from another mill. Failure to receive rounded-out ranges of sizes at one time has impeded rope production.

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IN 1942, possibilities for conserving fine wire in the 6 x 19 filler wire seale construction, in independent wire rope centers, and in

(Please turn to Page 796)

Outstanding Personalities of the Wire Industry

New Appointments By Firth-Sterling Steel Company J. B. Larkin, Chief Metallurgical and Sales Engineer Steel Division

J. P. LARKIN a graduate in metallurgy from Massachusetts Institute of Technology, has had broad experience with tool steels, Nitralloy and Stainless steels. For two years he served as Chief of the Tool Steel, Stainless and Lease Lend Alloy Steel sections of the Alloy Steel branch of the War Production Board in Washington, while on special leave of absence from the Crucible Steel Company.

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Andrew H. Godfrey, Assistant Manager, Firthite Division

ANDREW H. GODFREY, a native of Glasgow, Scotland, and a graduate engineer who has been closely associated with the tungsten carbide industry since its original development. Mr. Godfrey was factory manager of Carboloy Company, Detroit, until the entry of this country in the war, when he became production coordinator of the Cleveland Ordnance District, Army Service Forces.

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Anthony J. Allen, Assistant Manager, Firthaloy Division

MR. Allen is a graduate in metallurgical engineering from North Eastern University, Boston, and has been associated for 15 years in various capacities with the manufacturing end of the wire industry. He was with American Steel & Wire Company, was general superintendent of the production facilities of Wilson Steel & Wire Company, Chicago, and superintendent of Stainless and Alloys division of Pittsburgh Steel Company at Monessen, Pa. Since 1941 he had been superintendent of the Gary plant of Tubular Alloy Steel Company, affiliated with National Tube Company.

ANTHONY J. ALLEN
Asst. Manager, Firthaloy Div.,
Firth-Sterling Steel Co.

District Sales Managers Appointed

TWO district sales managers have also been appointed. **Thomas W. Gabriel** is the new Ohio district sales manager and **Lloyd W. Clowes** is Pittsburgh district sales manager. **Mr. Gabriel** majored in civil engineering at Rutgers University, after which he was associated with the New York office of Carnegie Illinois Steel Corporation. He was assistant to the manager there when he accepted the Firth-Sterling appointment. His headquarters will be in Cleveland.

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MR. CLOWES, head of the newly created Pittsburgh sales district, is a graduate of Rhode Island State College, where he majored in chemical engineering. A second lieutenant in the Army Air Forces in the first World War, he was with L. S. Starrett Company, manufacturer of precision measuring tools, for 25 years. In 1942 he was given a leave of absence to assume duties with W. P. B. in Washington where he served as Chief of the Cutting Tools section and Chief of the Gage and Precision Tools section of the Tools Division.

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Edgar H. Hammond, Jr., Manager of Sales and Field Engineering, Western Insulated Wire, Inc.

THE Western Insulated Wire, Inc., of Los Angeles, Cal., announces that **Edgar G. Hammond, Jr.**, has joined their organization as Manager of Sales and Field Engineering.

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MR. Hammond is especially qualified to assume these new duties as his entire business career has been spent in the electrical wire and cable industry. He started his business life in 1923 as an employee of the American Electrical Works which is now known as the Kennicott Wire and Cable Company of Phillipsdale, Rhode Island.

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MR. Hammond's training has been very basic indeed. He learned the business the hard way, going through the various departments of manufacturing at the factory's plants in Phillipsdale, then, after securing a thorough knowledge of the techniques involved in manufacturing insulated wire and cable, Mr. Hammond was appointed Salesman, representing his firm on the Atlantic seaboard.

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HIS progress was rapid, and very shortly he was appointed District Sales Manager, headquartering at the factory, which position he occupied until the outbreak of World War II. At this time, Mr. Hammond's corporation loaned him to the Government where he served as the Assistant Director of the Copper Division of the War Production Board at Washington, D. C., until he resigned in August of this year when he joined our organization as Manager of Sales and Field Engineering.

Officers Elected By John A. Roebling's Sons Company

CHARLES **Roebling Tyson** has been elected president of the **John A. Roebling's Sons Company,** manufacturers of wire products, with plants in Trenton and in Roebling, New Jersey. Mr. Tyson succeeds the late William A. Anderson, who died on September 10, 1944.

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ANNOUNCEMENT of Mr. Tyson's election was made at the company's executive offices, following a regular meeting of the Board of Directors on September 28, 1944.

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TWO years ago the Roebling company, now engaged almost one hundred percent in war production, observed the one hundredth anniversary of its founding by **John Augustus Roebling.** This is the fourth war in which the company has produced supplies and material for the Nation's armed forces.

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THE election of **Mr. Tyson** places in the presidency the grandson of **Charles G. Roebling,** son of the founder, who became president of the company when he was 28 years old and served in that capacity from 1877 to 1918. Mr. Tyson, who attended Episcopal Academy, Overbrook, and Princeton University, was born in 1914.

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MR. **TYSON** became associated with the Roebling company in 1935 and worked in various manufacturing departments, including the open hearth and wire mills at Roebling, N. J. In 1940 he was made secretary and treasurer of the company.

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THE election of **Lt. Joseph M. Roebling,** now serving abroad with the United States Army Air Corps, as chairman of the Board of Directors of the company, was also announced. **Lieutenant Roebling,** first vice president since 1936, is the son of the late **Ferdinand W. Roebling, Jr.,** who was the company's president from 1926 to 1936.

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ALSO announced, following the Directors' meeting was the election of **Archibald W. Brown** as treasurer and **H. D. Rathbun** as secretary and assistant treasurer.

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Lieut. Com. F. A. Westphal Now At Birmingham, Ala.

LIEUTENANT **Commander F. A. Westphal has** been transferred from Atlanta, Georgia, to Birmingham, Alabama, where he is now in charge of Naval material inspection. Commander Westphal is a past president of the Wire Association and recently delivered an inspiring address on behalf of the industrial incentive division of the Navy to the Alabama state C.I.O. Industrial Union Council Convention at Birmingham, Alabama.

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American Steel & Wire Changes

IN a move to round out the overall experience of its technical and operating personnel, two members of the staff of American Steel & Wire Co., a subsidiary of the United States Steel Corp., have exchanged positions. **Harry F. CLARKE,** formerly director of spring mill products, has been appointed superintendent of the spring mill and rail bond department at South Works, Worcester, Mass. At the same time, **Robert D. Knight** relinquishes his post to Mr. Clarke and assumes Mr. Clarke's former duties.

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MR. **Clarke** has worked for American Steel & Wire Co., since December, 1936, and has been director of spring mill products since April, 1943.

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MR. **Knight's** experience with the company dates back to November, 1932.

CHARLES ROEBLING TYSON
President

LT. COL. F. W. ROEBLING, III

LIEUT. JOSEPH M. ROEBLING, Air Corps,
Chairman, Board of Directors

✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

Steel Allocated For Civilian Production

THE War Production Board's Requirements Committee has allotted 100,000 tons of carbon steel and 25,000 tons of alloy steel for distribution to manufacturers of civilian goods during the fourth quarter of this year under the "spot authorization" procedure, J. A. Krug, Acting WPB Chairman has announced.

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IN the determination of allotments the following preferences in order of importance will be used as a guide:

1. **All applications which are certified by Smaller War Plants Corporation as hardship cases.**
2. **Applications from plants employing fewer than 250 wage earners,**
3. **Applications for authorization to produce Office of Civilian Requirements preferred products,**
4. **Applications indicating ability to use large quantities of surplus materials with "fill-in" amounts of new materials, or facilities immediately available for utilization of new materials, or provision for employing a large number of workers.**

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RESTRICTIONS imposed on field offices at this time apply only to the allotment of the 125,000 tons of steel now being set aside. It is expected that the restrictions will be lifted as the steel reserve is increased.

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THE new allotment of steel is in addition to allotments of copper and aluminum previously made for spot authorizations. Fifteen million pounds of copper and copper base alloy and 57.5 million pounds of aluminum are available for use under the program.

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Revised Ruling On Excess Inventory Steel

STEEL distributors may now apply for permission to deliver any off-grade or rejected steel or idle or excess inventory which they have been unable to move from their stock under the Controlled Materials Plan regulations, the War Production Board has announced.

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DELIVERIES may be made to any person who has an approved end-use, but who is not in a position to furnish a CMP allotment number or symbol with his order, WPB said.

(Please turn to Page 786)

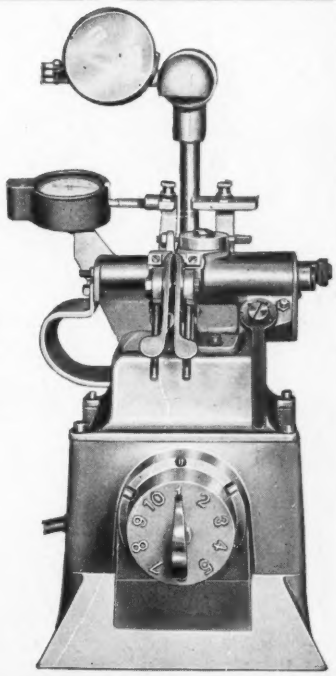
MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.

Model E.-I-S Welder Capacity .010 to .062" high & low carbon wire.



MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO 6, ILL.
Telephone, State 7468

Packaging Food and Ammunition for Our Armed Forces

SHIPPING TRADE SUPERSTRONG MARK CONTAINERS

Boxes bound with

KEYSTONE *Wire*

Superstrong* boxes are built for super safety. They are bound with dependable Keystone wire to assure the contents arriving "in fighting trim".

Keystone wire is also serving in thousands of fighting forms as parts of ships, tanks, planes, and guns. We are proud that Keystone wire "measures up" to so many exacting wartime uses.

**Rathborne Hair & Ridgway Co., Chicago, Ill., Savannah, Ga., and Jackson, Miss.*

KEYSTONE STEEL & WIRE CO., Peoria 7, Illinois

Special Analysis Wire for All Industrial Uses

SAMSON REG. U.S. PAT. OFF. SPRING WIRE KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Coppered, Tinned, Annealed, Galvanized

Government Wire Production Information

(Continued from Page 785)

WPB issued Direction 3 to CMP Regulation No. 4 effective September 13, 1944, to provide additional assistance to such distributors.

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Apparatus for Adjusting Frequency of Quartz Oscillator Plates

EQUIPMENT for precisely adjusting the frequency of quartz oscillator plates downward was announced recently by engineers of **North American Philips Company, Inc.**

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THIS special X-ray apparatus employs a new high-capacity water-cooled tube that attains the highest possible efficiency. Because the apparatus utilizes an extremely intense beam of X-rays, the problem of protecting the operator from stray radiation was of paramount importance. This difficulty was overcome by using a rotary fixture that exposes one crystal to the beam while another crystal is being loaded into a second holder.

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DEPENDING on the original characteristics of the plate, frequency may be lowered in the X-ray unit at a rate of 30 to 50 cycles per second per minute. It is possible to change the frequency of plates in the 6-8 megacycle per second range from 2-3 kilocycles per second total—this is the saturation value of such crystals. Higher frequency plates can be changed over a larger range.

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THE crystal holder is arranged so all crystal sizes from .4″ x .4″ up to .75″ x .75″ can be accommodated. Two crystals of each size may be placed in each holder —one is rotated to the X-ray beam while the other is being loaded. In this manner, oscillator plates may be placed successively into the beam giving complete protection to the operator. There are two crystal holders, one for each window of the X-ray tube.

THE X-ray equipment for irradiating crystals was developed at the request of the U. S. Army Signal Corps. **Dr. Clifford Frondel** of Reeves Sound Laboratories has experimented with this method which requires no artificial loading of the oscillator plate with foreign material. Not only that, the method permits exercising minute control over the process.

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Portable Air Operated Adjustable Gun Welder

EMPHASIZING the economical usefulness of extending the field of service of portable resistance welding equipment, considerable work has been accomplished by the **Eisler Engineering Co.** of Newark, 3, N. J., in improving and simplifying the adaptability of portable welders to a wide variety of postwar uses.

✦ ✦ ✦

WHERE the volume of production does not justify the purchase of large welding equipment—on places hard to reach with a stationary welding machine—when it is not practical to move the bulky work to the regular production line—this type of transportable, free swinging welding unit will have a definite place in the production set-ups, saving time and material, and reducing production costs without sacrificing the quality of work. Only the connection to the air, water, and power line is all that has to be done in employing this versatile welding unit.

✦ ✦ ✦

THE Eisler model of portable gun welder is shown in the accompanying photo. It is a direct air operated welding machine, equipped with a double acting air cylinder and the necessary operating mechanism, fully or semi-automatic, depending on the choice of control. The power part consists of an air cooled transformer, with an 8 tap switch for heat regulation (7 on and 1 off position), a pneumatic or electronic actuated timer, and a high speed mechanical or electronic contactor for accurately timing the weld in speed or automatic repeat of strokes. The weld cycle can be initiated by a foot switch as illustrated, or push button. The air system includes solenoid operated air valves, air filter, pressure regulator, gauge and switch and an air line oiler. The kickless cables of 500 M.C.M. are sufficiently water cooled in a single circuit.

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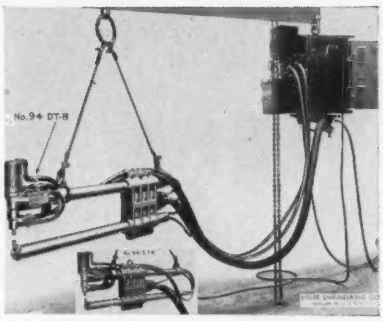
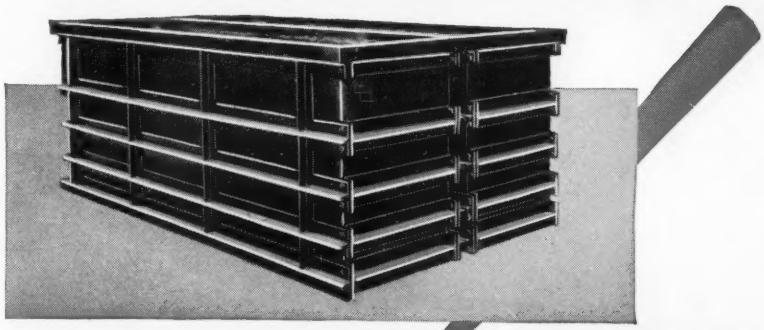
A DISTINCTIVE feature of this portable gun welder, is the convenient adjustment to different throat depths in a range of 12″ to 48″ as shown in insert.

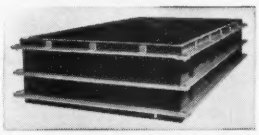


FOR PICKLING AND PLATING



HAVEG

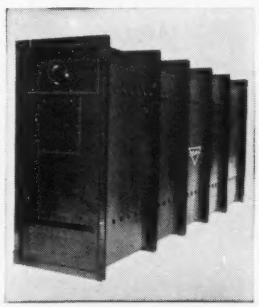
RECTANGULAR TANKS



HAVEG is a molded plastic which is unaffected by acids, alkalies, and chemicals generally. It is *not* a lining or coating but is resistant throughout its entire mass.

Rectangular Tanks as large as 12 feet long are made in seamless one-piece units. These tanks are made in standard sizes in which the outside dimensions are multiples of 6″. This standardization permits the production of an almost unlimited number of standard sizes in which no single dimension will vary more than 3″ from a customer's requirement.

Bulletin F-3 gives complete engineering, design and application data on all types of Haveg Equipment, Pipe and Fittings. Send for your copy.



HAVEG-SARAN *Tubing; Pipe & Fitting.; and sheets are available from stock.* HAVEG-SARAN *is also described in Bulletin F-3. Send for a copy now.*

HXP-43

HAVEG CORPORATION

NEWARK, DELAWARE

FACTORY–MARSHALLTON, DELAWARE

CLEVELAND 14 — 550 Leader Building

CHICAGO 11 — 1201 Palmolive Building

DETROIT 11 — 2832 E. Grand Blvd.

LOS ANGELES 13 — 601 W. Fifth St.

Outstanding Personalities of the Wire Industry

(Continued from Page 784)

John J. Gillis, Vice-President of Sales, Spencer Wire Co., West Brookfield, Mass.

JOHN J. GILLIS, Worcester, Massachusetts manager of sales of the Worcester District of the American Steel and Wire Company, has resigned that position effective as of October 1, 1944, to become affiliated with the Spencer Wire Company West Brookfield Plant, located in West Brookfield, Massachusetts. Mr. Gillis, who has been with the American Steel and Wire Company for more than thirty years, has been elected vice-president in charge of all sales with the Spencer Wire Company West Brookfield Plant.

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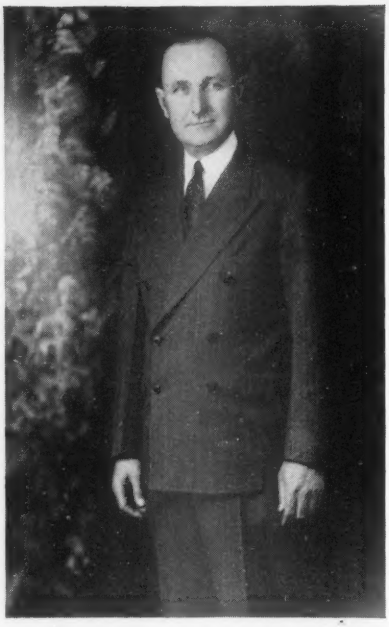
SINCE 1940, Mr. Gillis has been in charge of the Worcester District Sales Office. Prior to that time, he was located in the Boston Office and before then in New York City, where he started his career in the wire and steel industry. His duties consisted of both engineering and sales work, devoting his time exclusively to the latter item for the past twenty-five years.



JOHN J. GILLIS
Vice President of Sales,
Spencer Wire Co., West Brookfield, Mass.

✦ ✦ ✦

HE is a member of the Worcester Rotary Club, the Worcester Economic Club, the Worcester Club, the Nutmeggers of Conn., the Worcester Country Club, the New England Railroad Club, and both the Engineers Club and University Club of Boston. He is also a past president of the New England Hardware Associates.

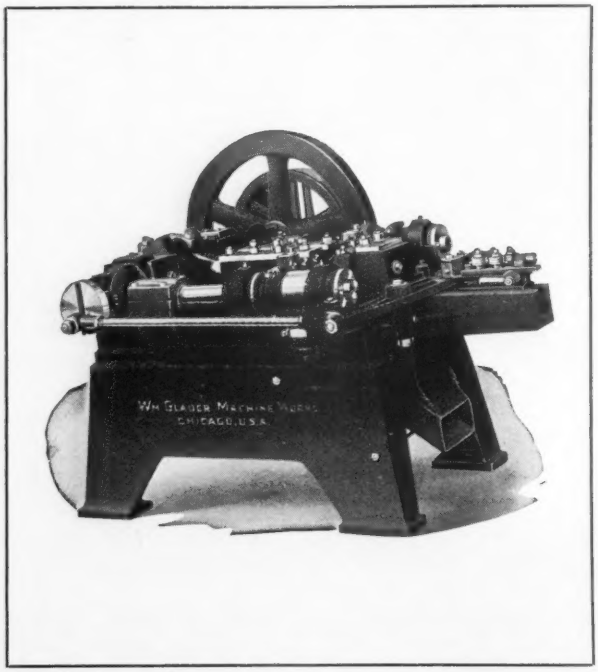
✦ ✦ ✦

IN becoming affiliated with the Spencer Wire Company West Brookfield Plant, Mr. Gillis will direct much of the post war plans of that firm, which has recently expanded its Plant and undertaken the manufacture of special alloy wires such as stainless steel, phosphor bronze and resistance wires.

✦ ✦ ✦

OTHER officers of the Spencer Wire Company West Brook-

GLADER HIGH SPEED WIRE NAIL MACHINE



High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS

210 NO. RACINE AVE.
CHICAGO, ILLINOIS

field Plant are William H. MacDonald, Worcester, president and treasurer; Lawrence J. Woods, Worcester, corporation clerk and plant engineer; and Francis P. Leahey of West Brookfield, the general manager.

✦ ✦ ✦

R. C. Wilson Appointed Sales Manager, Farrell-Birmingham Buffalo Division

FARREL-BIRMINGHAM COMPANY, INC., of Ansonia, Conn., and Buffalo, N. Y., announce the appointment of **R. C. Wilson** as sales manager of its Buffalo division, in charge of sales of gears, gear units, flexible couplings and related products.

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MR. Wilson was born in Elmira, New York, where he received his early education. Following his graduation from the University of Rochester in 1925 with a degree of Bachelor of Science in Mechanical Engineering, he was employed by the Gleason Works in Rochester for seven years. While with that company he specialized on spiral bevel gears and the development of the hypoid gear. Coming to Farrel-Birmingham Company in 1934 as Sales Engineer, Mr. Wilson worked in that capacity until 1942 when he became assistant to the Sales Manager, which position he held until his present appointment.

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Clifford W. Robinson, President, New Brunswick Fence Co.

CLIFFORD W. ROBINSON, 78, of Moncton, N. B., died recently, in a Montreal hospital, where he had been undergoing special treatment. He had been ill for two months. He was president and a member of the board of the New Brunswick Wire Fence Company, with plant and head office in Moncton. He had been financially interested in this firm the past 35 years, and had been president for 15 years. Born at Moncton, he had been very active in politics, having been a Moncton alderman and mayor, a member of the New Brunswick legislature, a member of the New Brunswick government as provincial secretary and minister of lands and mines. While the Liberal party was in opposition, he was provincial assembly opposition leader. He served as provincial premier for a few months, but his government was defeated at the polls. In 1924, he was appointed to the Canadian senate, which seats are held for life of the holders. He was a senator at his death and had been active in the deliberations of that body at Ottawa, Ont., each session.

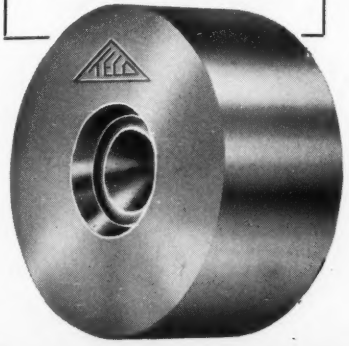
Rome Cable Corp. Elects Officers

AT a Directors' Meeting, held at the **Rome Cable Corporation**, October 2, 1944, the following changes of personnel were voted on. Mr. H. T. Dyett, who has been President of the Rome Cable Corporation since 1936, resigned, and was elected Chairman of the Board. Mr. A. D. R. Fraser, who has been Secretary, was elected President, and Mr. J. H. Dyett was elected Secretary.

ARE ALL CARBIDES ALIKE?

NOT BY A LONG SHOT!

WIRE AND BAR DIES
EXTRUDING DIES SIZING DIES
TUBING DIES
Also Carbide Blanks, Tools, Kits, Reamers and Forming Tools



TECO Cemented Carbide is different! It's denser, harder, more uniform. Has greater resistance to wear and friction. Produces longer runs of smooth, on-size wire. Reduces non-productive die-changing time.

Test smooth-wearing, slow-wearing TECO Carbide Dies in your plant. Increased tonnage per die will demonstrate the difference between TECO Cemented Carbide and all others. Let our engineers know your requirements.

TUNGSTEN ELECTRIC CORPORATION
564 39th STREET, UNION CITY, N. J.
Branch Office: 2906 Euclid Ave., Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.

TECO
Pioneers in Tungsten Carbides for over a Quarter Century
CARBIDE DIES

New Requirements of Signal Corps

DEMANDS for Field and Assault Wire.—After the Allied invasion of Europe, Signal Corps requirements for 110 B field wire and 130 A assault wire increased greatly, it was stated. At present the Army Service Forces are two months behind in filling requisitions for such wire coming in from the theater of War Operations. Industry therefore faces the problem of greatly increasing the production of field and assault wire to meet the military demands.

✦ ✦ ✦

IT was suggested that the existing specifications on field and assault wire be modified immediately so that companies now making the wire could obtain greater production. Less rigid specifications would permit greater production and at the same time give a serviceable wire.

✦ ✦ ✦

Signal Equipment Production

WPB reports that the total communication and electronic equipment output for July declined eight per cent and was six per cent short of the first-of-month schedule. In August the situation was better: seven per cent above July, three per cent short of schedule. Field wire, a critical item, showed a large deficit in July, because the Independence Day holiday cut into production, and also because facilities were currently undergoing expansion to provide a new type of insulation. The lag was reversed in August, with ASF miscellaneous communication equipment jumping five per cent ahead of schedule and seven per cent above the July level.

✦ ✦ ✦

Firth-Sterling Steel Company Receives Third Production Award

FIRTH-STERLING Steel Company, McKeesport, Pa., has received word from Robert P. Patterson, Under Secretary of War, that it has won for the third time the Army-Navy Production Award for high achievement in production of war material, President L. Gerald Firth announces.

✦ ✦ ✦

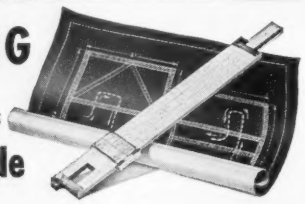
THE company, which manufactures tool steels, high speed steels, stainless steels, drill rods and wire, and carbide tools and dies, received its original "E" award on May 7, 1943. The first renewal was conferred Nov. 6 of last year.

✦ ✦ ✦

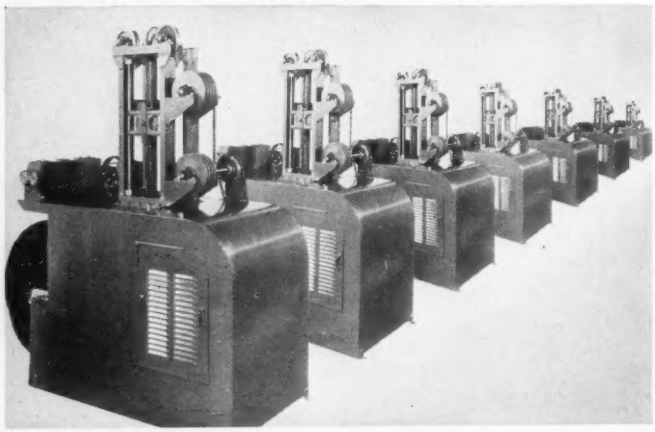
Ross Opens Boston Office

THE J. O. Ross Engineering Corporation of New York has announced the opening of a new branch office at 79 Milk Street, Boston 9, Mass. The Boston Office is to be in charge of **Frank W. Partsch**, Vice-President.

OVEN ENGINEERING NEWS



IOE Windup Machine Now Made In Quantity Lots for Many Problems of Wire Manufacture



• Originally developed as special equipment to speed the production of more uniform cable insulation finishes, the **IOE** constant-speed constant-tension windup machine has since provided a solution for a number of other manufacturing problems. It is now used for saturating take-up, respooling, continuous spark testing take-up, single-reel extrusion take-up, and tubing, waxing and enameling take-up.

These machines are still made to individual order, but all parts are standardized, and the units are being built in quantity. Two standard sizes are now available. These are:

No. 1—26" - 36" reel diameter
No. 2—12" - 24" reel diameter

The **IOE** windup machine is a complete, self-contained unit with combination variable speed and hydraulic synchronizing equipment, designed to provide constant speed and constant tension within a variable production range. By arrangement of adjustable tension devices, tension on the material can be varied from a few ounces to hundreds of pounds. The machine is motor driven, requires no outside source of power or synchronization, and can be used in conjunction with either driven or friction unwind machinery. It is supplied in higher speeds for extrusion windup of rubber and synthetic insulation materials.

GET MORE DATA

• "Blueprint for Industry — Part III" describes the **IOE** windup machine in detail. Send for your copy.

(This is No. 13 of a series. Reprints of previous advertisements will be sent free upon request.)

THE INDUSTRIAL *Oven Engineering* COMPANY

11621 Detroit Avenue **Cleveland 2, Ohio**

Signal Corps Cites Critical Need For Increase in Wire Production

EXPLAINING the critical need for more wire, the Chief Signal Officer, **Major General H. C. Ingles,** has notified wire manufacturers that the War Production Board has placed field and assault wire on the production urgency list as one of the items on which increased production is vitally needed to assure continued offensives all over the world.

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THIS action was taken, according to the Chief Signal Officer, because stepped up demands from the theaters of war made it imperative that an increased supply be forthcoming immediately.

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HE stated that wire is a weapon of offense and the greater the offensives the greater the need for wire. "Many great soldiers," General Ingles continued, "have seen the fruits of victory taken from them because of the lack of communications, and many enemies have been permitted to fight another day because communications were inadequate."

✦ ✦ ✦

THE Chief Signal Officer referred to his recent inspection tour of the fighting fronts and the tremendous quantities of wire he saw in actual combat, fighting, so to speak, "alongside soldiers." "In a war as mobile as this," he said, "where great offensives develop from what appears to be merely feints with tanks, mortars, and field pieces, wire is the very life line of the soldier carrying on the offensive. There is little time to salvage, only time to fight under such conditions."

✦ ✦ ✦

IN issuing this call for all-out production, General Ingles cautioned that the brighter the news from the fighting fronts, the greater will be the need for wire. "Wire must be manufactured in increasing quantities until V-Day," he declared.

THE WIRE ASSOCIATION
WHAT IT GIVES YOU FOR $10.00 ANNUAL DUES

1. WIRE & WIRE PRODUCTS — For One Year.
The official publication of The Wire Association covering the Wire Industry; its Metallurgy, Technology, Research, Processes, Machinery and Personnel.
2. THE ANNUAL BUYERS GUIDE & YEAR BOOK OF THE WIRE ASSOCIATION.
The Year Book Section contains: Constitution and By-Laws of The Wire Association; Details of year's meetings, etc.; List of Members, Index to Papers and Articles in WIRE & WIRE PRODUCTS.
3. QUESTIONS AND ANSWER SERVICE.
Answers to technical and operating problems direct by mail. Available to members only.
4. ANNUAL CONVENTION AND EXHIBITION.
(In Association with American Society for Metals and The National Metal Congress.) Technical Sessions, Plant Inspections.
5. REGIONAL MEETINGS.
Attendance at the regional meetings which include Local Plant Inspections. Technical Sessions and Discussions.
6. PERSONAL CONTACTS.
Both at Annual and Regional Meetings, and throughout the year, for interchange of helpful information.
7. INFORMATION SERVICE ON MACHINERY, EQUIPMENT AND SUPPLIES.
The Technical, Catalogue and Correspondence Files of the Wire Association hold the answer to practically every "Where can I buy" problem. This service is available to members without charge.

FOR DETAILED INFORMATION ADDRESS
RICHARD E. BROWN, Executive Secretary
300 MAIN STREET, STAMFORD, CONN.

SERVICE YOU'LL LIKE
On Drums or Traverses*

You get these advantages by ordering steel drums or traverses from Hubbard's Garrett Division:

(1) Selection of standard sizes—6" to 60"—in plain, painted or hot dip galvanized finish.
(2) Shipment from a central location convenient to all wire mills.
(3) Assurance of quality backed by Hubbard's 32 years of experience.

It will be worth your while to write for price and delivery details. Send us your letter today.

*Under license arrangement with the Western Electric Company, Inc.

HUBBARD SPOOL COMPANY
1624 CARROLL AVENUE | CHICAGO 12, ILLINOIS
Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.

PLANTS AT CHICAGO, ILLINOIS AND GARRETT, INDIANA

A Review of Recent Wire Patents

No. 2,357,342, METHOD OF DRAWING WIRE, patented September 5, 1944, by Harley A. Montgomery, Highland Park, Mich.

In the manufacture of steel wire, the steps comprise drawing rods, subjecting the rods to a pickling bath, thereafter subjecting the rods to a neutralizing bath including lime without depositing a coating of this lime of material thickness on the rods, then subjecting the rods to a reducing operation by successively passing them through a series of drawing dies, and applying a finely divided mixture comprising a dry lubricant and a powdered material corrosive in effect on the metal of the rods, immediately prior to the passage of the rods through at least one of the dies.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents; outside United States and Canada, $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

"Steelskin Brands"

Reg. U. S. Pat. Office

WIRE, TUBING, STAMPING, DEEP DRAWING SOAPS AND COMPOUNDS

The "Steelskin" Brand Now Includes a Line of New Metallic Soaps*

Lubricants for Dry & Wet Drawing of Ferrous and Non-ferrous Wire, Tubing, and Deep Drawn Parts

✦ ✦ ✦

ANNOUNCE:

WT COMPOUND FOR WET DRAWING GALVANIZED WIRE

New and entirely different basic ingredients give trouble-free operation on all types of wet continuous machines with perfect finishes and exceptional die life.

★ **"STEELSKIN" CH**, WIRE DRAWING SOAP POWDER FOR STAINLESS STEEL — EITHER OXIDE COATED AND LIMED — OR LIMED ONLY. AND ALSO FOR OTHER DIFFICULT DRAWING.

Back of the **"STEELSKIN" TRADE MARK** is a Thirty-Five Year Period of Experience in the Development and Manufacture of **Soaps and Compounds** For Dry and Wet Drawing of all Types of Ferrous and NonFerrous Wire.

Our Engineers Will Be Glad to Co-Operate With You in Finding the Most Economical And Efficient Solution to Your Drawing Problems.

*The demand for these new soaps has been so great that we have had to put up a new building in which to make them. We are now in a position to supply them to other mills who have been unable to get them heretofore.

R. H. MILLER COMPANY, INC.

HOMER, NEW YORK

Established 35 Years

No. 2,357,492, FOURDRINIER WIRE, patented September 5, 1944, by Otto A. Abendroth, Menasha, Wis.

This Fourdrinier wire belt comprises woven weft and warp wires, one of the groups of wires being formed from hard metal and the other of the groups having a hard metal core and an outer shell of soft metal incasing the core, this first named group of wires being adapted to imbed themselves in the soft shells of the second mentioned group of wires during the weaving of the belt.

✦ ✦ ✦

No. 2,357,821, HYDRAULIC WINDING MACHINE, patented September 12. 1944, by Ferris T. Harrington and James Robinson, Detroit, Mich., assignors to Vickers, Incorporated, Detroit, Mich., a corporation of Michigan.

A new means is provided for acceleration of the winding drum gradually, to avoid breakage of the material being wound.

✦ ✦ ✦

No. 2,359,003, SPRING INSERT CUSHION, patented September 26, 1944, by Fred A. Sawyer, South Bend, Ind., assignor to Mishawaka Rubber and Woolen Manufacturing Company, Mishawaka, Ind., a corporation of Indiana.

The cushion is of spongy rubber with cylindrical cavities, carrying wire coil springs, some of the springs having normal height greater than the depth of the cavities.

✦ ✦ ✦

No. 2,359,090, COMPOSITE ELECTRICAL CONDUCTOR, patented September 26, 1944, by Daniel P. Dyer, Jr., Chagrin Falls, Ohio, assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

A central straight wire is provided, having a relatively high tensile strength, with two smaller-diametered wires of good conductivity wound helically around the straight wire.

✦ ✦ ✦

No. 2,359,095, CONTINUOUS PRODUCTION OF ELONGATED METAL STOCK, patented September 26, 1944, by Flint C. Elder, Cleveland Heights, William M. Henry, Garfield Heights and Malcolm W. Reed, Shaker Heights, Ohio, assignors to The American Steel & Wire Company of New Jersey, a corporation of New Jersey.

Metal stock is processed in cold condition and the method comprises stretching the stock, cleaning the surface thereof, copper coating the cleaned surface, sull-coating the coppered surface, and then cold-reducing the stock.

✦ ✦ ✦

No. 2,359,170, WIRE ROPE PRESTRESSING MACHINE, patented September 26, 1944, by Daniel D. Symmes, West Haven, Conn., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

This assembly includes two rotative elements for engaging the opposite ends of a relatively large length of the strand to be stressed, means for supporting this length against yielding lateral deflection of any material extent, a frictional brake restraining rotation of one of the elements, and a motor for rotatively powering the other to cause it to pull the strand from the element restrained by the brake and stress the strand, the brake having a device for adjusting its restraining force and the apparatus including a device for measuring the stress in the stressed strand length.

✦ ✦ ✦

No. 2,359,224, ELECTROMAGNETIC DEVICE, patented September 26, 1944, by Kornelis Swier Knol and Maximiliaan Julius Otto Strutt, Eindhoven, Netherlands; vested in the Alien Property Custodian.

About the wire core is a layer of dense coherent ferro magnetic particles on the support formed by electrolysis at current densities of approximately 30 ma/cm.^{2}, this layer having a thickness in excess of 1.5 microns and a permeability of substantially 100 for a range of frequencies from zero up to approximately 10^9 cycles/second.

✦ ✦ ✦

Notes On Technical Papers

(Continued from Page 780)

second station extrusion rapidly results through pick-up due to improper lubrication. As a remedy, he suggested that it is necessary to remove both dies and repolish them. Otherwise, he stated, heat checks resulting from high temperature stresses will rapidly result in chipping and breakdown of the die. This paper will be printed in the January, 1945, issue of **Wire and Wire Products.**

✦ ✦ ✦

THE MORDICA MEMORIAL LECTURE

SUBJECT: "Carbon Steels for The Wire Industry"

Presented By

A. M. Reeder, Metallurgical Engineer, Jones & Laughlin Steel Corp., Pittsburgh, Pa.

A. M. Reeder, metallurgical engineer, Jones & Laughlin Steel Corp., Pittsburgh, in presenting the Mordica memorial lecture entitled, "Carbon Steels for the Wire Industry," attributed the rapid progress of the wire industry to the advances made in both quality and quantity of steel production. He pointed out that the bessemer process still continues to be one of the most interesting methods of making steel. Some bessemer heats exhibit a greater capacity for cold work than others, he explained, even though there is no noticeable difference in the regular chemical analysis or ingot practice. Recent developments have pointed to the fact that such heats were likely lower than normal in nitrogen and that the nitrogen-phosphorus ratio is closely associated with the sensitivity of the steel to cold work. He drew attention to the recent development on the photocell, or so-called "flame control," for bessemer steelmaking in obtaining a more uniform and higher quality product.

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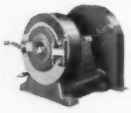
HE announced that extensive investigations of other methods for controlling the factors effecting the work hardening characteristics of bessemer steel are under way, the results of which,

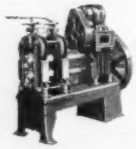
(Please turn to Page 799)

"Standard" Machinery
For Metal Processing

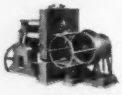


SWAGERS
All sizes, for pointing, forming or attaching fittings to bar, cable or tube. Catalog SM.

PRESSES
Foot and Power, for primary and secondary operations. Catalogs PP and PF.



ROLLING MILLS
For rolling strip, rod, and ingot. End Mills for grading and tube forming. Catalog RM.



TURKS HEADS
With adjustable rolls for drawing wire into rectangular or special shapes. Catalog TH.

For specific recommendations write

STANDARD
MACHINERY COMPANY
Providence 7, R. I.

We also manufacture Draw Benches, Drop Hammers, Welding Positioners, Mechanical Transmissions, Fluid Drives and Bearings.

Dust Collector Catalog

A NEW catalogue of self-contained DUSTKOP dust collectors for collecting the dust from all sizes of surface, tool, pedestal, disc grinders and sanders is now available from AGET-DETROIT COMPANY, 602 First National Building, Ann Arbor, Michigan.

✦ ✦ ✦

A FEATURE of the catalogue is the indexing according to grinder sizes rather than by dust collectors, which permits selection of the correct dust collecting equipment for any type of dust source.

✦ ✦ ✦

DIMENSIONS of each unit are given in sketches and in specification tables, a further aid to the determination of the space requirements of the collectors and accessories required with prices of the complete units, are given at the front of each section.

Reference Book for Grinding Wheel Users Available

TO acquaint grinding wheel users with the newly announced standard markings for identifying grinding wheels and other bonded abrasives, The Carborundum Company has prepared Grinding Facts, a 136 page reference book on grinding—including a complete explanation of the new marking symbols; a comprehensive schedule of grading recommendations for general, toolroom, diamond wheel, and thread grinding; a description of each common type of grinding; safety rules; and a table of useful speeds.

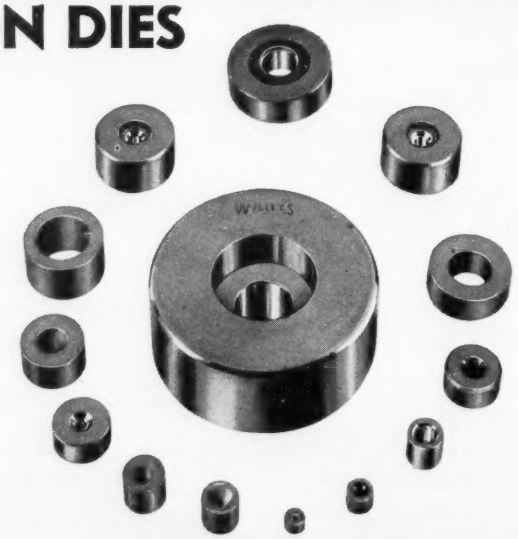
✦ ✦ ✦

FOR a free copy of Grinding Facts, write on your business or company letterhead to The Carborundum Company, Niagara Falls, N. Y.

WILLEY'S DIES LAST MUCH LONGER

WIRE DRAWING, SIZING and EXTRUSION DIES

Manufactured in all sizes, to meet your requirements, from a specially developed grade of Tungsten Carbide having freedom from porosity, exceptional abrasion resistance and the ability to take a polish equal to that of diamonds. Furnished in four classifications, (1) blank and rough cored nibs, (2) rough cored dies, (cased), (3) semi-finished, rough drilled dies, (cased), (4) finished dies, ready to use.



WRITE FOR CATALOG

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

Fine Steel Wire Drawing Dies of Special Grade Carbide Now Carried in Stock By Carboloy

EXTRA-performance dies specifically designed for the drawing of fine steel wire of approximately .015 inch diameter and under (designated as R-1 dies in the Carboloy catalog) and made from Grade 999 cemented carbide are now being carried as stock items at Carboloy Company, Inc., Detroit 32, Michigan. This particular grade of carbide is the hardest metal produced by them.

✦ ✦ ✦

AS a result of the extreme hardness possessed by Grade 999, there are certain difficulties attendant to its fabrication into dies, that make necessary a slight premium over prices for similar standard dies of other grades of metal. It is said, however, that their extra hardness enables Grade 999 dies to produce wire of greater uniformity and high surface finish over a longer run than other carbide dies, thus more than compensating for the added cost. Field reports indicate that the hardness of dies made from 999 cemented carbide permits their use in certain operations possible heretofore only with diamond dies.

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Wickwire Spencer's Mechanical Specialties Division Moves to Clinton, Mass.

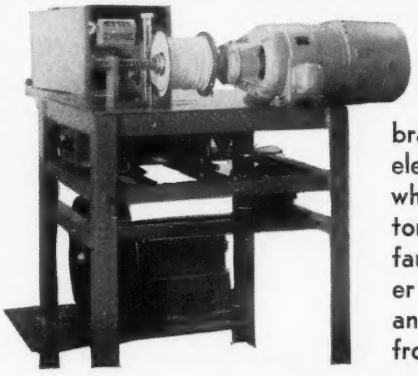
THE **Wickwire Spencer Steel Company** has announced that since October 2nd, the General Sales Office of the Mechanical Specialties Division has been located at Clinton, Massachusetts, where the products of this division are manufactured. The Mechanical Specialties general sales office had been previously located at 500 Fifth Avenue, New York 18, New York. A District Sales Office of this division will continue to be maintained at the New York address.

✦ ✦ ✦

PRODUCTS of the Mechanical Specialties Division of Wickwire Spencer include, Industrial Wire Cloth, Metal Conveyor Belts, Card and Napper Clothing, Perforated Metals and Grilles.

SPARKER for SPOOLING
SMALL WIRES

THIS APPARATUS WILL AUTOMATICALLY STOP WHEN DIELECTRIC FAULT OCCURS, or when the machine has wound a predetermined length of wire.



It is equipped with a gear head motor, electrical brakes on take-up and pay-off, electrode, control apparatus which automatically reduces the torque of the motor in starting, fault light indicator, transformer with tap switch, volt meter, and variac. Range of voltage from 1,000 to 16,000 volts.

Please Address Inquiries To:

R. L. DAVIS ELECTRIC CO., INC.

WALLINGFORD, CONN.

NEW — AND BETTER
The Trauwood PROCESS

PATENTING
TEMPERING
ANNEALING

OUTSTANDING ADVANTAGES

Higher and more uniform physical and fatigue properties.
No surface decarburization or scale.
Faster wire speeds . . . greater production.
Equipment fully automatic and easy to operate.
Control of heating and cooling cycles extremely accurate.
Thermal efficiency of the process very high.
Much finer grained structure possible.
High quenching temperatures rapidly attained.
Adaptable to high alloy and austenitic steel wire and strip (annealing of stainless).

Trauwood Electric Wire Tempering and Patenting Unit

The Trauwood Process, new in principle, eliminates high temperature furnaces and lead pots with their excessive maintenance costs and low thermal efficiencies. More positive temperature control is possible and quenching is done in a RISING temperature—instead of falling, as in conventional heat treating methods. The rapid rate of heating (4 to 5 times as fast as furnace heating) increases production and uniformly produces a finer grained product with higher physical and fatigue values.

Wire and rod patented by the Trauwood Process insures easier drafting and makes heavier reductions possible. In conjunction with the Trauwood patenting equipment, pickling, coating and baking can be made continuous, eliminating expensive handling and delay, materially reducing costs as compared with ordinary methods.

Complete details of the Trauwood Process will be furnished you on request. Our engineers will help you solve your continuous wire and strip patenting, tempering, and annealing problems. Write today.

THE TRAUWOOD ENGINEERING COMPANY

1740 E. 23rd STREET, CLEVELAND, OHIO, U.S.A.

NORBIDE Abrasive

For Wire Drawing Dies

NORBIDE Abrasive successfully replaces expensive diamond powder in efficiently shaping, grinding and polishing wire drawing dies — particularly those made of the hard cemented carbides. NORBIDE is the registered trade mark for Norton Boron Carbide (B_4C) — the hardest material made by man.

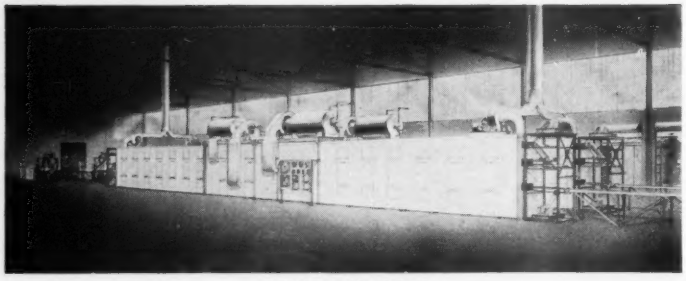
NORTON COMPANY

Worcester 6, Massachusetts

MORE PRODUCTION IN LESS TIME *with* CARL-MAYER FURNACES, OVENS

CARL-MAYER HI-SPEED ROD BAKER

The fastest rod baker built! Saves up to 50% in time and fuel. Patented Blow-Off Feature removes moisture without bumping or agitating the coils. **Patented and patents pending.**



WELDING ROD OVEN

For drying coated welding rods. Uses the "Mayer" Recirculating Gas Fired Air Heater principle and Rod Transfer Systems (patents pending).

Growing interest in our type of equipment is evidenced by Carl-Mayer installations in such plants as:—

Atlantic Wire Co.
Atlas Tack Corp.
Atlas Steel Co.
Eaton Mfg. Co.
Hollup Corp.
Johnson & Nephew Ltd.
Page Steel & Wire Co.
Pittsburgh Tool Steel Wire Co.
Steel Co. of Canada
Wickwire Spencer Steel Co.

WRITE FOR BULLETIN #241

THE CARL-MAYER CORPORATION 3030 EUCLID AVENUE CLEVELAND, OHIO

Advisory Committee Recommendations

(Continued from Page 782)

6 x 37 constructions were submitted to the wire rope industry through its trade association. At that time it was suggested that the independent wire rope center, which requires a considerable amount of fine wire, be replaced by a strand center, that the filler wire seale construction be eliminated, and that the 6 x 37 constructions be curtailed as much as possible. The response from industry indicated a willingness to conserve material to the extent necessary to furnish fine wire requirements for aircraft, the urgent program in 1942. Some companies not only adopted the suggested economies in 1942 but have maintained them; others have failed to make any appreciable reduction in output of constructions requiring excessive quantities of fine wire. This situation is reflected in industry reports to WPB on production and in orders from the Bureau of Yards and Docks and the United States Engineers, that millions of feet of FWSC and IWRC rope constructions are still being manufactured.

✦ ✦ ✦

THE exigency of releasing fine wire from present constructions so as to extend wire rope footage makes it imperative that industry accept responsibility for reducing footage of high carbon rope wire consumption. As a guide to discussion of the problem, copies of a folder containing the following data were distributed to the committee and the guest engineers:

1. **Suggested methods for obtaining wire savings, with comparative charts showing materials required in present and proposed constructions and diagrams showing the composition of present and proposed constructions;**
2. **Proposed Restrictions of:**
   a. **Independent wire rope centers in 1" and under to strand center;**
   b. **6 x 19 filler wire seale construction wire ropes in sizes 1" and under to Warrington construction; and**
   c. **6 x 37 wire rope to two constructions, either to be furnished at the option of the contractor.**

Filler Wire Seale Construction

AN additional 500 to 600 tons of .013 to .030 wire a month must be furnished to the Army from now until December. In order to permit wire mills to furnish this additional amount of fine wire, high-carbon blocks must be relieved. The Steel Division has become increasingly concerned about the expanding backlog of rope wire and wire rope production, the backlog in the latter being greater than that of any other controlled material under its jurisdiction. Uncertain as to the exact cause for increasing backlog, the Steel Division believes that lack of manpower is the primary deterrent to production. A committee member's remark that his company itself could balance the deficit in fine rope wire production if sufficient manpower were available confirmed this supposition. Conservation of fine wire will release a considerable percentage of manpower to production of heavy wires and utilization of heavy-wire capacity. Elimination of fine wire from the filler wire seale construction will not only increase potential wire rope footage but will also balance the range of sizes that may be shipped to both integrated and nonintegrated companies.

✦ ✦ ✦

Comparative Life and Serviceability of Present and Proposed Constructions

IN response to a statement that production of FWSC has been required in certain installations, it was stated that the proposed elimination of 6 x 19 filler wire in FWSC had been based on evidence that the average rope company can serve a Warrington construction in ¾" and under without any serious impairment to service.

✦ ✦ ✦

IT was conceded that the Warrington construction had given satisfactory service, even in elevator rope, prior to the adoption of FWSC. Service increased 25 per cent, however, when FWSC was

(Please turn to Page 798)

NILSON AUTOMATIC PRESS AND FOUR SLIDE MACHINE

FOR SWAGING, STAMPING, PIERCING, BLANKING, FORMING OF COILED METAL

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For Wires and Filaments from .0005" to 1/16" and Flat Stock Up to ⅛"

Wire Cutting Mach.

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Automatic Drawing and Cutting Mach.

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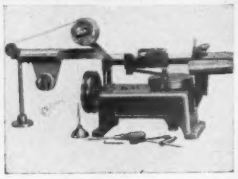

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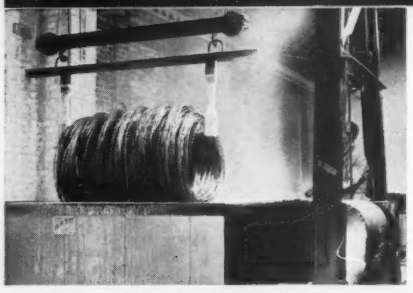
WIRE SHAPES

MORRISON FLASH BAKERS



Save Time
Cut Costs
Speed Production

Fifty-three Morrison Flash Bakers now in operation in 29 plants are proving to wire manufacturers that their cost is an investment that pays dividends because of these operational features—

1—Space saving—size of a lime tank
2—Fit straight line or circle setups
3—Reduce cleaning house fog
4—Rust-free rod
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Advisory Committee Recommendations

(Continued from Page 797)

substituted. An engineer differed as to the comparative service of Warrington, particularly in lang lay ropes. Superior service of FWSC in mining ropes had been found only in laboratory tests on a fatigue machine, another member of the group said.

✦ ✦ ✦

IT was conceded that many thousand feet of wire for 7/16" to ⅝" rope and considerable spooling of strand machines could be conserved by substitution of the Warrington construction for FWSC. While the crucial need for conserving fine wire is universally recognized, however, the need for maintaining service in both military and essential industrial activity must be kept in mind. For some types of equipment, Warrington cannot be substituted for FWSC without impairing service; the extent to which service would be impaired cannot be stated at the moment.

✦ ✦ ✦

New Method of Surface Inspection Developed

AN entirely new and revolutionary method of surface inspection, called **FAXFILM,** has been developed by **Rex D. McDill** of 5109 Mayfield Road, South Euclid, Ohio.

✦ ✦ ✦

BY this means the surface to be examined is etched in the usual fashion, and a plastic film, one surface of which has been softened with a solvent, is pressed onto the etched surface, and then stripped off.

✦ ✦ ✦

THIS film, placed in a projector, can be magnified to 100 diameters, and the resulting picture will be shown as a three dimensional projection. The film can be filed for future reference and can be re-examined at any time.

✦ ✦ ✦

THE process is said to be inexpensive, simple and speedy.

Notes On Technical Papers

(Continued from Page 793)

he stated, undoubtedly will be of considerable value to the wire industry. Many items which now require a sulphurized open-hearth steel for balanced free machining and cold forming properties, may be produced more satisfactorily in the future from a scientifically controlled bessemer steel application.

✦ ✦ ✦

INGOT practice, Mr. Reeder explained, is determined by the extent to which deoxidization has been effected before the steel is teemed into the molds. In order to decrease the oxygen content, typical mold practices are described as rimmed, capped, semi-killed and killed. Deoxidization is regulated in both the furnace and ladle according to predetermined schedules for the various grades produced.

✦ ✦ ✦

IN the production of a rimmed ingot, he stated, the desired action requires a relatively high oxygen content so that a rapid gas evolution or effervescence will occur in the mold. Killed steels are treated with relatively large amounts of deoxidizing agents, such as silicon or aluminum, in the furnace or ladle, in order to eliminate the excess gas or render it inactive. Solidification proceeds quietly but somewhat more rapidly than in the case of a rimming steel, producing an ingot of greater homogeneity.

✦ ✦ ✦

CAPPED steels are also used to some extent in the wire industry for certain low-carbon applications.

✦ ✦ ✦

OF the three types of steel, rimmed steel might be classified as most ideal for wire drawing, particularly in conditions drafting to the finer gages.

(Please turn to Page 800)

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extra large for deep drawing, cartridge cases, liners, and cans, are also made with TALIDE NIBS
FULL PARTICULARS ON REQUEST
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METAL CARBIDES CORPORATION
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Notes On Technical Papers

(Continued from Page 799)

THE most desirable type of mold at present appears to be the big-end-up type with refractory lined hot top. However, a large tonnage of high quality steel still is being cast regularly in properly designed big-end-down mold fitted with refractory hot tops.

✦ ✦ ✦

EXHAUSTIVE investigations have been conducted to determine the most desirable mold wash to apply and the proper procedure for applying it. Tar of the right grade is one of the most popular mold washes used. When applied correctly, a bright, hard, even coating is formed which protects the mold surface and materially improves the surface quality of the ingot.

✦ ✦ ✦

IN conclusion, Mr. Reeder stated that precautions must be exercised in rolling the ingot, bloom or billet in order to obtain surface quality. The rolling characteristics of each steel grade must be considered in reducing the ingot or bloom to the desired section. Adequate consideration today is given by the roll designer to the prevention of both mechanical and steel rolling defects. This lecture will be published in the January, 1945 issue of **Wire and Wire Products.**

✦ ✦ ✦

PAPER: "Synthetic Insulation"

G. E. Rolston, Chief Engineer, Rome Cable Corp., Rome, N. Y.

THE wire and cable industry is the second largest consumer of rubber, but its requirements are still only about one-tenth of the requirements of the tire industry. This was pointed out in a paper on "Synthetic Insulation" by G. E. Rolston, chief engineer, Rome Cable Corp., Rome, N. Y.

✦ ✦ ✦

POLYETHYLENE, a thermoplastic resin compound, at the present time is used exclusively for certain types of combat wire and for coaxial cable on radar equipment. As soon as greater quantities of this material are available, it will undoubtedly find many uses on civilian wire products.

✦ ✦ ✦

NEOPRENE has been used for approximately ten years as a jacket or sheath on portable cords and cables, and experience with this material has indicated that it is superior to rubber for this class of service.

✦ ✦ ✦

MEMBERS of a technical committee of the wire industry have recently completed the preparation of a specification for Buna-S in the crude form. This specification has been submitted to the two plants that are making Buna-S for the wire industry and they are trying to produce a more uniform product in conformance with this specification.

✦ ✦ ✦

PAPER: "Discussion on the New Plastic —Polythene and It's Adaptation for Insulation of Electric Wire and Cable, together with a Discussion of Plastic Used with Nylon in a New Switchette."

Dr. J. W. Shackleton, Plastics Div., E. I. DuPont de Nemours Co., Wilmington, Delaware

DR. John W. Shackleton, plastics department, E. I. duPont de-Nemours & Co., Wilmington, Del., in discussing "New Development in Plastic Insulating Materials", stated that the outstanding development of recent years in the application of synthetic materials to cable insulation is the new plastic, polythene. The remarkable dielectric properties alone mark it for an eminent place in the electric field.

✦ ✦ ✦

DEVELOPMENT of extrudable types of nylon has been the result of several years of research work. A nylon is now available which can be extruded in standard equipment at temperatures attainable by present commercial wire coating processes. The die used is a modified, self-centering tubing

(Please turn to Page 804)

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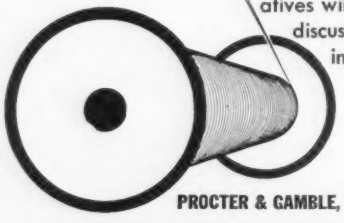

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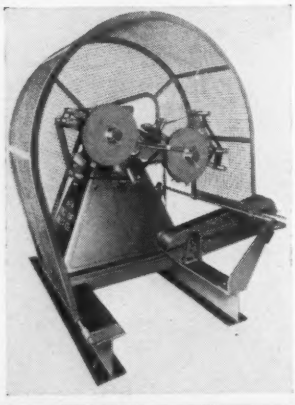

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Automatic brake on main spindle of each unit.

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Cable Reel Plant Layout

By J. William Stair

Mr. Stair, Secretary and Treasurer of the B. M. Root Company, York, Pa., manufacturers of multiple boring and special machines, herewith presents a brief description of a layout for a cable reel plant that will make possible the production of these products with a minimum of handling and a maximum of speed. ✦ ✦ ✦ ✦ ✦

THE war demands for wire and cable have been such that the need for cable reels has been greatly increased, making it highly desirable for cable reel plants to be so laid out and equipped that the production of these products may be both economical and efficient.

✦ ✦ ✦

THE war demands for wire and lumber. This may be either air or kiln dried material. The stock enters the mill on buggies or dry kiln trucks, and goes through the following machines and operations:

First—Cut-off saws. These should be types that will cut the material at an angle in order to save lumber. Cutting at an angle permits nailing the cross-band pieces to an approximate circle so that band saws have a minimum of material to remove.

Second — Assembly table. These should be such as to permit laying out or assembling the material in cross band form for the nailing machines.

Third—The nailing machine. These are preferably a wide opening type that will permit the lumber to be swung to various nailing positions.

Fourth—Band saws. Right-hand and left-hand band saws are desirable for convenience in positioning the machines in the line of production.

Fifth—Reel Borer. A multiple spindle reel borer can bore as many as seventeen holes in an 84" diameter reel head, saving many steps. Borers are also available for all lesser diameter reels. A second reel borer may be used in the line of production on reels of 42" diameter and under.

Sixth—The starting hole. Many reels require a starting hole for which operation a starting hole borer of the single spindle type is used. This type is important in these instances as it saves a hand operation.

Seventh—Painting. Spray booths are next conveniently located in the line for painting and stenciling.

Eighth — Final assembly. Assembly tables should be provided for the further assembly of the reels.

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PROTECTIVE COATINGS for STEEL & WIRE

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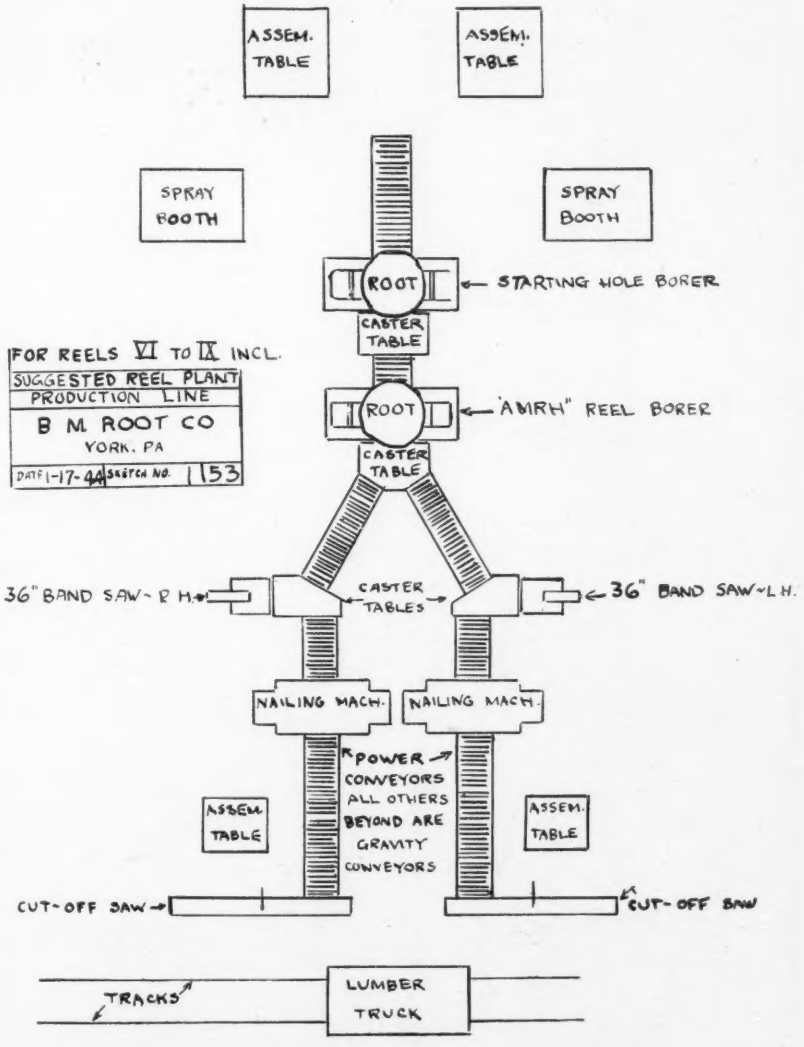
CONVENTIONAL power conveyors are used up to the nailing machines. Gravity conveyors of the ball bearing roller type are used in double line up to the boring machines, and in single line beyond this point.

(Please turn to Page 802)



Oakite Pre-Coating Provides 3 Advantages!

More wire mill superintendents are discovering that by using Oakite Composition No. 24 for smut removal and pre-coating prior to liming in the cleaning house, they obtain these three outstanding advantages:

1. It neutralizes all acid remaining on rod and also removes traces of iron sulphate.
2. Oakite Composition No. 24 adheres firmly to the rod or wire so that no rusting or pitting occurs on the surface.
3. As an undercoating, it serves as a carrier for an even lime coating which in turn assures better adherence of the die box lubricant.

Because it so satisfactorily meets these requirements, Oakite Composition No. 24 makes possible better wire, more tonnage from the same equipment, less rejected wire. Details FREE!

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Cable Reel Plant Layout

(Continued from Page 801)

CASTOR tables are used at the band saws and in front of the multiple boring machine to facilitate swinging the material for a circular cut at the band saws or for positioning for boring at the multiple boring machine.

✦ ✦ ✦

THE foregoing production line allows the reel parts to be handled with a minimum of physical effort, and in a straight line from the raw material to the finished product.

✦ ✦ ✦

Sergeant Develops Wire Examining Device

TONS of field wire, that might otherwise be discarded, are being salvaged because of the ingenuity of **Staff Sergeant Pasqual L. Wamil,** Santa Barbara, California, assigned to a Services of Supply Signal Depot Company at a United States Army invasion base in Southern England, according to reports received in the Office of the Chief Signal Officer.

✦ ✦ ✦

SERGEANT WAMIL, a native of Sanchez Mira, Gagayan, P. I., has developed a device which records defects in the insulation of wire used for field telephones.

✦ ✦ ✦

SGT. WAMIL contrived the device at the behest of officers in charge of his Signal Corps section. It would be impossible, they argued, to examine for defective insulation every inch of wire returned for salvage. Couldn't some sort of device be constructed—along the lines of an electric eye—that would indicate when there was a rupture in the insulation?

✦ ✦ ✦

SGT. WAMIL thought it could be done. He constructed a working model from a roughly-drawn pencil sketch. The model, at the outset, was about as crude as the blueprint. Not knowing whether

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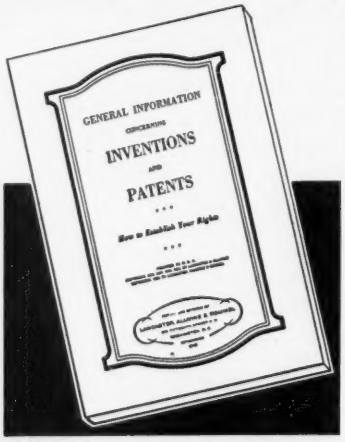

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his initial efforts would be successful, the sergeant used only scrap material.

✦ ✦ ✦

THE device was broken down into two parts—a control box which by means of a ringing bell recorded any defect in the insulation, and a series of pipes, or electrodes, through which the tested wire passed while being wound onto reels. The pipes, with a funnel attached to either end to permit smoother passage of the wire, were connected by wire to the control box.

✦ ✦ ✦

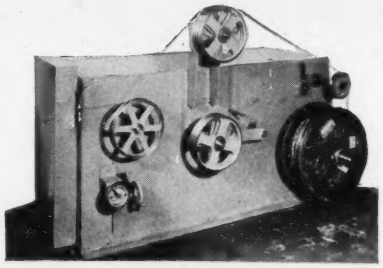
POWER-operated spools coiled the wire after it passed through the pipes. Whenever there was a break in the insulation a spark was relayed between the electrodes and the wire passing through, causing a warning bell in the control box to ring. It was a relatively simple matter, then, to find the break, however minute.

✦ ✦ ✦

TO add to the testing capacity of the device, Sgt. Wamil employed four electrodes instead of one, plugged in separately to the control box. On the front panel of the control box he mounted four simple hand switches which, when closed, set the current going between the electrodes and the control box. Above each switch was attached a small wooden tab, hinged at the bottom of the panel, and held upright magnetically to a metal plate linked by wire to the corresponding plug-in from the electrodes. The purpose of the tabs was to show which of the four wires being tested had a broken insulation.

✦ ✦ ✦

IF it was the wire on spool Number One, tab Number One would drop when the current was interrupted. If on another spool, the corresponding tab would drop. By employing the tabs as indicating devices, it also was possible to keep in operation, while a defective wire was being repaired, any or all of the remaining spools.



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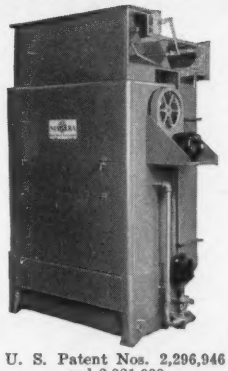

U. S. Patent Nos. 2,296,946 and 2,321,933

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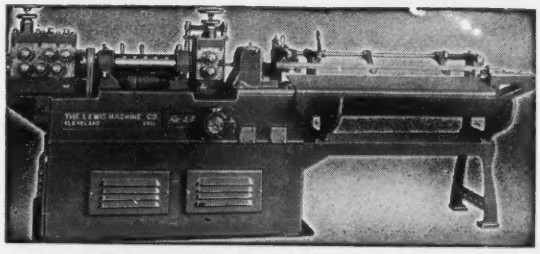

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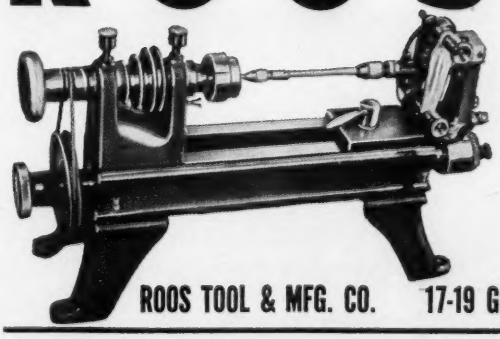

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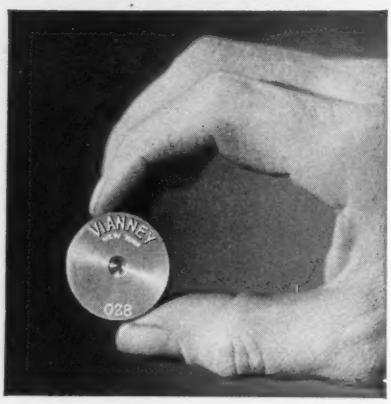

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WIRE DIE CORPORATION

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Tel. Col. 5-1340

Notes On Technical Papers

(Continued from Page 800)

design which allows for the free flowing qualities of the nylon. A tube of nylon is extruded and is laid snugly over the wire, the wall thickness being controlled primarily by the wire speed. Coatings of less than one mil thickness have been applied by this method.

✦ ✦ ✦

Cleaning Booklets

A 16-PAGE booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants and describes typical designs of degreasers has just been published by **Detrex Corporation,** Detroit 27, Michigan, under the title of "Solvent Degreasing and Effective Methods of Conserving Chlorinated Solvents."

✦ ✦ ✦

"DETREX Triad Alkali Cleaners," an 8-page booklet describes in detail alkali and emulsion cleaning compounds developed for all types of metal cleaning jobs. It also covers the many uses and applications of alkali cleaning materials in aircraft, automotive, railroad, metal fabricating and other industries.

✦ ✦ ✦

H. Arthur Dunn

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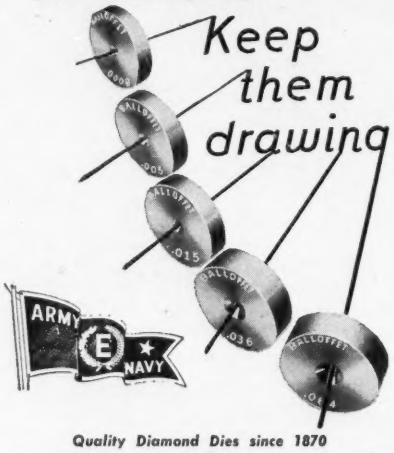

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The Behavior and Control of Wet Wire Drawing Lubricants For Copper

(Continued from Page 772)

stroyed as well as the foam. Benzol is a fugitive type of foam killer and will disappear by evaporation over a period of time. Remarkably small quantities have been effective. Pouring 1/2 to 1 pint of benzol into the lubricant solution as it leaves the machine to return to the pit appears to be the most desirable place to add the foam killer. This amount has reduced the foam generation when added to several thousand gallons of solution.

✦ ✦ ✦

Laboratory Control

THE two most important items in checking the condition of a lubricant solution are the strength or percentage of the solution and the pH. Both should be determined regularly—daily, if experience shows significant changes take place in 24 hours. The larger the reservoir of the solution for a given number of machines, the less the change over a period of time. Both tests can be made in a matter of minutes. The Babcock test, is, of course, used to get the total percentage of soap and fat in solution.

✦ ✦ ✦

OWING to carbonation, yielding alkali other than that associated with the soap, soap titration values are not reliable as indicating actual soap, exclusive of the fat. However, these values are of use in charting any abrupt changes which may occur to the system.

✦ ✦ ✦

Summary

Once a lubricant has been put into successful use in a wire mill, the important factors to check in order to maintain good performance are:

1. **The condition of the water.**
2. **The maintenance of the Babcock Test percentage within the prescribed limits for successful performance.**
3. **The maintenance of the pH in the proper operating range.**

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Index To Advertisers

A

Ajax Industrial Supplies, Inc. 804
American Chemical Paint Co. 756
American Insulating Machinery Co. 803
American Lanolin Corp. 801
Apex Alkali Products Co. 805
Apco Mossberg Co. 806

B

Balloffet Dies & Nozzle Co., Inc. 804
Bethlehem Steel Co. 750
Bick, Hans C., Inc. 805
Brewer Mfg. Co. 806
Broden Construction Co., The ..... Inside Front Cover

C

Carboloy Company, Inc. 749
Carl-Mayer Corp., The 796
Ceilcote Company, The 802
Cheney Bros. 753
Cleveland Tramrail Div. of Cleveland Engineering Co. 807
Cochaud Wire Die Corp. 804
Continental Steel Corp. 755
Crepe-Kraft Co., The 806

D

Davis, R. L., Electric Co. 795
Dewey & Almy 793
Durant Mfg. Co. 806

E

Eisler Engineering Co. 798
Electric Furnace Company ..... Back Cover
Emory, Robert J., Co. 807
Entwistle, James L., Co. 766

F

Fidelity Machine Co. 807
Firth-Sterling Steel Co. 770
Fort Wayne Wire Die, Inc. 804

G

Gilron Products Co., Inc. 799
Glader, Wm., Machine Works 788

H

Hartley, Geo. D. 805
Hartley Wire Die Co. 767
Haveg Corp. 787
Heil Engineering Co. 807
Hubbard Spool Company 791
Hudson Wire Co. ..... Inside Back Cover

I

Indiana Wire Die Co. 804
Industrial Oven Eng. Co. 790

J

Jersey Steel & Wire Corp. 805
Jones & Laughlin Steel Corp. 757

K

Keagler Brick Co. 807
Kelly Wire Die Corp. 804
Keystone Steel & Wire Co. 786

L

Lancaster, Allwine & Rommel 802
Lewis, K. B. 805
Lewis Machine Co., The 803
Luginbill Wire Die Co. 804
Lyon-Vail Machine Co., Inc. 806

M

Magnus Chemical Co. 754
Metal Carbides 799
Michigan Wire Die Co. 797
Micro Products Co. 785
Miller, R. H., Co. 792
Morgan Construction Co. 768
Morrison Engr. Corp. 798
Moslo Machinery Co. 807
Mossberg Pressed Steel Corp. 806

N

National Annealing Box Co. 807
National Machinery Exchange 806
New England Butt Co. 800
Niagara Blower 803
Nilson, A. H., Machine Co. 797
North American Philips Corp. 804
Norton Company 796
Nukem Products Co. 807

O

Oakite Products, Inc. 802
O'Neil-Irwin Mfg. Co. 806

P

Parkin, Wm. M., Co. 807
Pennsylvania Industrial Engineers 807
Plastics Div. of Carbide & Carbon Chemicals Corp. 763
Platt Bros. & Co., The 806
Porter, H. K., Inc. 802
Potter, Neil C. 805
Procter & Gamble 800

R

Robertson, John, Co., Inc. 758
Rockwell, W. S., Co. 807
Roos Tool & Mfg. Co. 803
Ross, J. O., Engineering Corp. 807
Royle, John, & Sons 752
Ruesch, H. J., Machine Co. 807
Rusch Wire Die Corp. 805

S

Sauereisen Cements Co. 807
Scott, Henry L., Co. 805
Scudder, E. J., Foundry & Machine Co. 807
Shell Oil Co. 759
Sleeper & Hartley, Inc. 805
Standard Industrial Compounds Co. 751
Standard Machinery Company 794
Stevens Metal Products Co., The 769
Surface Combustion Div. of General Properties Co., Inc. 807
Syncro Machine Co. 761

T

Torrington Mfg. Co., The 806
Trauwood Engineering Co. 795
Tungsten Electric Corp. 789

U

United Die Co. 805

V

Vascoloy-Ramet Corp. 760
Vaughn Machinery Co. ..... Front Cover
Vianney Wire Die Works 804

W

Waterbury-Farrel Fdry. & Machine Co. 806
Watson Machine Co. 780
Wayne Wire Die Co. 805
Wickwire Spencer Steel Co. 764
Willey's Carbide Tool Co. 794
Wilson, Lee, Engr. Company 807

Y

Youngstown Sheet & Tube 765

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Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
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Kelly Wire Die Corp., New York, N. Y.
Metal Carbides, Inc., Youngstown, Ohio.
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Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
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DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING AND PRE-HEATING ROOMS—
Industrial Oven Engr. Co., Cleveland, O.

DRYING EQUIPMENT—
Rockwell, W. S., Co., New York, N. Y.
Ross, J. O., Engr. Corp., New York, N. Y.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Humidifying
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCES AND FENCING—Wire
Wickwire Spencer Steel Co., New York, N. Y.

FLASH BAKER—
Morrison Engr. Corp., Cleveland, Ohio

FLUX—Galvanizing
Dewey & Almy Chemical Co., Cambridge, Mass.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Oven Engr. Co., Cleveland, O.

WHERE TO BUY, Continued

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Trauwood Engr. Company, Cleveland, Ohio
Wilson, Lee, Engr. Co.. Cleveland, Ohio

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Pennsylvania Industrial Engrs., Pittsburgh, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Electric
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio

FURNACES—Hardening & Tempering
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Normalizing
Carl-Mayer Corp.. The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING EQUIPMENT—
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING FLUXES—
Dewey & Almy Chemical Co., Cambridge, Mass.

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSULATING MATERIALS — Electric Wire & Cable
Carbide & Carbon Chemical Corp., Plastics Div., New York, N. Y.

INSULATION LACQUERING SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, O.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry & Machine Co., Waterbury, Conn.

LININGS—Acid and Alkali Proof
Ceilcote Co., The, Cleveland, Ohio.
Heil Engineering Co., Cleveland, Ohio.

LIQUID FOAM BLANKET—
Dewey & Almy Chemical Co., Cambridge, Mass.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
American Lanolin Corp., Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Rick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Procter & Gamble, Cincinnati, Ohio.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co.. Philadelphia, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Syncro Machine Co., Rahway, N. J.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson. N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, Ohio
Eisler Engineering Co., Newark 3, N. J. (for Tungsten Wire)
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co.. Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Mach'y Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Philadelphia, Pa.
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio
Eisler Engineering Co., Newark 3, N. J.
Lewis Machine Co.. The, Cleveland, Ohio
Moslo Machinery Inc., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.

MACHINERY — Die Making for Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Draw Benches
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co.. Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging
Broden Construction Co., Cleveland, Ohio.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
Robertson, John. Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark 3, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc.. Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming
Eisler Engineering Co., Newark 3, N. J.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

WHERE TO BUY, Continued

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY — Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Brockton, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Broden Construction Co., Cleveland, Ohio.
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Equipment—Sparkers
Entwistle, Jas. L., Pawtucket, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Industrial Oven Engr. Co., Cleveland, O.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark 3, N. J.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Eisler Engineering Co., Newark 3, N. J.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

NAILS—Wire
Youngstown Sheet & Tube Co., Youngstown, Ohio.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Shell Oil Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Cable Lacquering
Industrial Oven Engr. Co., Cleveland, Ohio
Rockwell, W. S., Co., New York, N. Y.

OVENS—Dehydrogenizing
Industrial Oven Engr. Co., Cleveland, O.
Rockwell, W. S., Co., New York, N. Y.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Oven Engr. Co., Cleveland, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Rockwell, W. S., Co., New York, N. Y.
Ross, J. O., Engineering Corp., New York, N. Y.

OVENS—Welding Rod Coating
Industrial Oven Engr. Co., Cleveland, O.
Rockwell, W. S., Co., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING TANK LININGS—
Ceilcote Co., The, Cleveland, O.
Heil Engineering Co., Cleveland, Ohio
Keagler Brick Co., Steubenville, Ohio.
Sauereisen Cement Co., Pittsburgh, Pa.

PIPES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.

WHERE TO BUY, Continued

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.
POTS—Lacquer
Industrial Oven Engr. Co., Cleveland, O.
POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.
POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)
PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.
PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.
PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.
QUENCHING BATH CONTROL—
Niagara Blower Co., Buffalo, N. Y.
REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.
REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
REELS—Traverse
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio.
REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.
ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.
RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Youngstown Sheet & Tube Co., Youngstown, Ohio.
ROLL STRAIGHTENERS—
Moslo Machinery Co., Cleveland, Ohio
ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Brewer Mfg. Co., Muncy, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.
RUST PROOF COMPOUNDS—
American Lanolin Corp., Lawrence, Mass.
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
SATURATION SYSTEMS—
Industrial Oven Engr. Co., Cleveland, O.
SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Procter & Gamble, Cincinnati, Ohio.
Standard Industrial Compounds Co., Chicago, Ill.
SOLVENT RESIN SYSTEMS—Experimental
Industrial Oven Engr. Co., Cleveland, O.
SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.
SPRINGS—Steel
Wickwire Spencer Steel Co., New York, N. Y.
STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.
STRAND—Steel and Copper
Brewer Mfg. Co., Muncy, Pa.
STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.
SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
TANK LININGS—Brick
Ceilcote Co., The, Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Corp., Buffalo, N. Y.
TANKS—Compound
Watson Machine Co., Paterson, N. J.
TANKS—Pickling
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Nukem Products Corp., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.
TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
TEMPERATURE CONTROLS—
Niagara Blower Co., Buffalo, N. Y.
TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.
TESTING INSTRUMENTS—
Scott, Henry L., Co., Providence, R. I.
TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.
TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
TREADS—Safety
Norton Co., Worcester, Mass.
TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.
TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.
VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.
VULCANIZERS—
Watson Machine Co., Paterson, N. J.
VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
WELDERS—Spot and Butt
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
WIND-UP AND UNWIND SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, O.
WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, Ohio.
WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
WIRE—Enameled for Coils
North American Philips Corp., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn
WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.
WIRE—Music
Jersey Steel & Wire Corp., Irvington, N. J.
WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
WIRE—Non-Ferrous to Specification for Special Purposes
Hudson Wire Co., Ossining, N. Y.
North American Philips Corp., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.
WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.
WIRE—Stainless Steel
Firth-Sterling Steel Co., McKeesport, Pa.
Jersey Steel & Wire Corp., Irvington 11, N. J.
WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.
WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.
WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.
YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.
YARNS—
Cheney Bros., New York, N. Y.

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Cadmium, Nickel Silver, 10%, 18% and 30%; Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire.

Cadmium, Nickle Silver, (10%, 18%, 30%); Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

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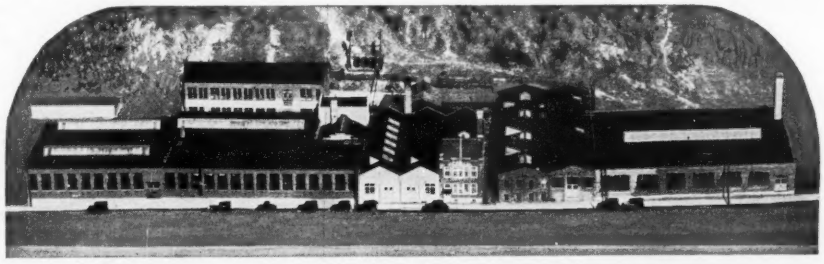

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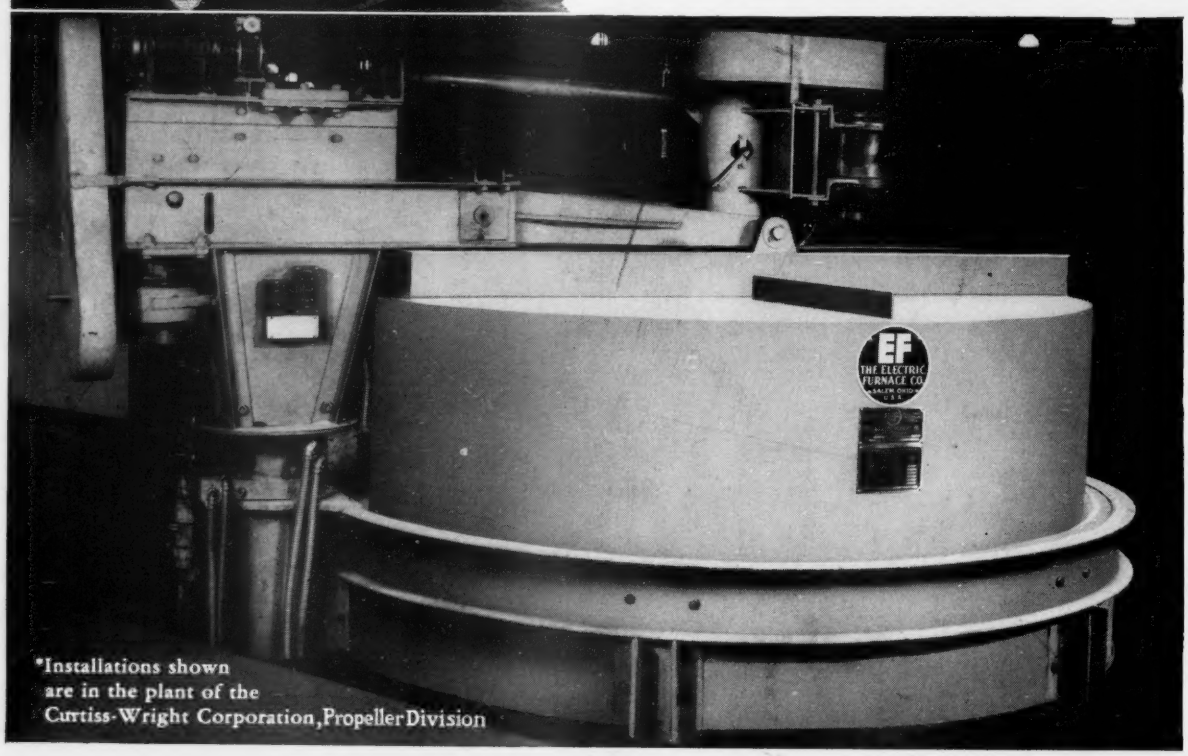
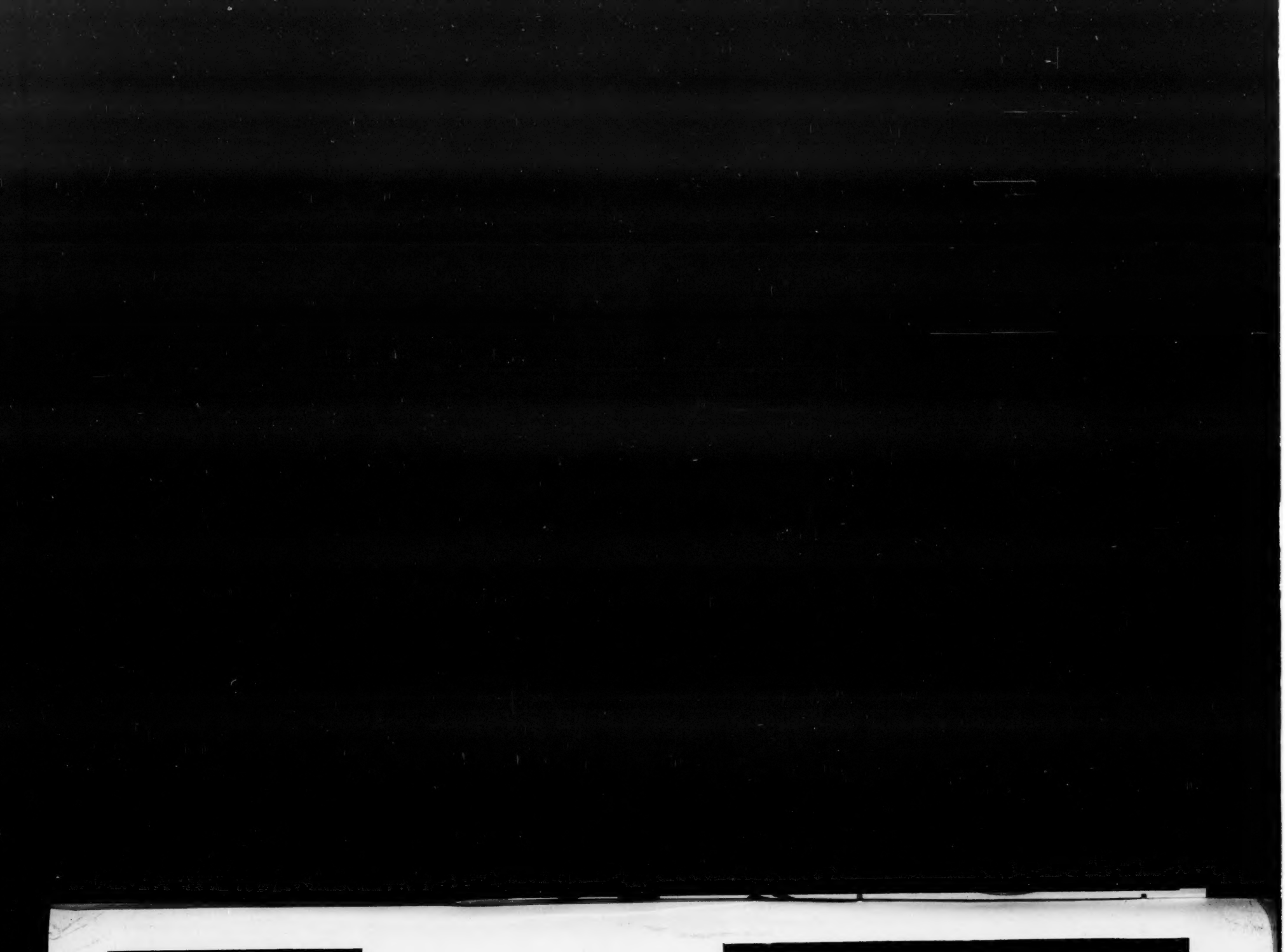
*Installations shown are in the plant of the Curtiss-Wright Corporation, Propeller Division